TestMaker
A system for writing, printing, grading and analyzing multiple choice tests

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June 21, 2010

Contents

1 Introduction

TestMaker will help you write multiple choice tests, print them so that every student gets a different test, record student grades and analyze the results for each question.

TestMaker uses LaTeX and Ghostscript to display and print tests with nice mathematical formatting. You create multiple-choice questions using LaTeX syntax, so you can easily create questions and answers using conventional mathematical symbols and graphs.

When TestMaker prints student tests it will print the answers in random order, and the order of the questions can be randomized as well. This will discourage students from copying each other's answers during the adminstration of the test.

Each student test has a unique test number, and you will grade the tests by entering this number followed by the student's answers. TestMaker will then give you a report detailing how each student answered each question, the total number of questions each student answered correctly, and the total number of students who chose each answer for each question. This last bit of information will tell you which questions were the most difficult, and it may help you diagnose major misunderstandings in your class.

If you skip to the end of this manual, you can see an example of a test and grade report produced by TestMaker.

Throughout these notes, special typefaces are used for file names, **Menu Selections** and `keyboard input`.

TestMaker runs on PC's under Windows XP, Vista and Windows 7.

Thanks to jordan russell software (www.jrsoftware.org) for providing free installation software Inno.

Feedback and bug reports to my e-mail address will be appreciated.

2 Setup

TestMaker comes as an install file setup_TestMaker.exe. When you run this file, the program TestMaker.exe and the help file TestMaker_help_file.pdf are both placed in the directory C:\Program Files\TestMaker. Click on the program icon

to run TestMaker.

To use TestMaker, you must have a LaTeX compiler, a dvi-viewer, a dvi-to-postscript translator and a Postscript printing program. I recommend that you use the TeX system MikTek 2.7 (http://miktex.org/[1]) and the postscript utilities Ghostscript and Ghostview (http://pages.cs.wisc.edu/ ghost/). Ghostscript and Ghostview must both be installed. You only need to install a "basic" MikTex system. If you have installed MikTek, Ghostscript and Ghostview in their

[1] there is **no** *www* in this URL!

default folders, then TestMaker will run as installed. If you installed Miktex, Ghostscript or Ghostview components in non-standard folders, or if you wish to use a different LaTeX or Postscript utilities, click on the menu item **Setup** when you start TestMaker. You will open a dialog box that permits you to specify programs to perform them four required operations. Any information you enter will be retained when you close TestMaker and restart it later.

3 Writing a Test

3.1 Writing a Test with TestMaker

Here's how you write a test with TestMaker.

1. Start TestMaker
2. Click on **File/New**
3. Click on **File/Save As...** and give your file a name and a place in your folders. To prevent losing your work, it's a good idea to save your file every five to ten minutes. To save your file, click on **File/Save** or the disk icon on the toolbar.

   Your file will be saved with the extension .tmk. This is the extension that TestMaker uses to identify its source files.
4. Write your test in the space provided.

   (a) Put any introductory material you want at the beginning of the test. You are writing in LaTeX , so you can use LaTeX conventions to write **bold** or *italic* text,

   center text,

   write mathematical symbols like $\sqrt{\frac{2}{\pi}}$ and so forth. There is a list of on-line LaTeX resources in an appendix to help you get started.

   (b) To start the first problem, put the symbols **%%** on a line by themselves. Then type your question, using LaTeX syntax to enter the mathematical symbols.

   (c) When you have finished writing your question, put the symbol **%** on a line by itself, then write the **correct** answer to your question. At the end of the answer, make another line with the symbol **%** and write a wrong answer. Add as many wrong answers as you want, preceding each by a line containing **%**.

   (d) When you have written all your answers to the first question, begin the next question with a line containing **%%**. Write the question and answers as before.

(e) You should save your test every few minutes by clicking on **File/Save** or clicking the disk icon on the toolbar.

(f) To see how your questions will be typeset, click **File/Save and View** or click the TEX icon on the toolbar. Your test will be saved and compiled, and a window will pop up showing you how your questions will appear to your students. You can also view your test while you are working on it. I usually view my test after completing each question. The typeset document that you see is called the **master test**. *You must compile the master test before printing the student tests.*

If you use anything besides plain text in your questions, there is a good chance that your test will not compile on the first try. It is easy to make errors in LATEX code. The compile screen will stop and tell you something about your error, but if you are not experienced in using LATEX you may find it difficult to figure out your mistake from the cryptic screen message. Just remember—you have mastered advanced mathematics, and you can certainly master LATEX. Try the LATEX resources in the appendix.

(g) You can print the master test after compiling it by clicking **File/Print Master Test** or clicking on the printer icon on the toolbar.

Here's a sample test as you would enter it into TestMaker. You can see a much longer and more realistic example that includes graphics in the Appendices.

```
Sample calculus and statistics questions
%%
Evaluate $\int_0^{2\pi} x \sin x dx$
%
$-2\pi$
%
$2\pi$
%
6.4
%
-6.4
%%
If men's heights average 69" with a standard deviation of 2.6",
how tall must a doorway be for 98\% of men to pass through
without bending?
%
76"
%
75"
%
74"
%
77"
```

After compiling, the master test would look like this:

Sample calculus and statistic questions

1. Evaluate $\int_0^{2\pi} x \sin x dx$
   (a) -2π
   (b) 2π
   (c) 6.4
   (d) -6.4
2. If men's heights average 69" with a standard deviation of 2.6", how tall must a doorway be for 98% of men to pass through without bending?
   (a) 76"
   (b) 75"
   (c) 74"
   (d) 77"

3.2 Keeping problems together

You may have some problems that you do not want presented in random order. A calculus test may ask more than one question about a function or graph; a statistics test may pose several questions about the same data set. If you want force two or more problems to be presented sequentially (at a random position in the test), separate one problem from the next with the the symbol %%% instead of %%. Here is an example. Problem 1B will always follow problem 1A, so the only order in which problems will appear to students is 1A,1B,2 or 2,1A,1B.

Notice when you have a group of problems that you want to keep together, you may add a preface to the group. Here's an example of a short test with two problems grouped together.

```
A short test
%%
Consider the function
$\displaystyle y=\frac{1}{\sqrt{1-x^2}}$.
%%%
What is $\displaystyle \frac{dy}{dx}$ when $x = 0.6$?
%
$\displaystyle \frac{dy}{dx}=1.17$
%
$\displaystyle \frac{dy}{dx}=1.28$
%%%
What is the equation of the tangent line to the graph
of $y$ above $x=0.6$?
%
$y=1.17x+0.22$
%
$y=1.28x+0.34$
%%
Suppose the tangent line to a graph at some point is
$y=3.4x-2.6$. At this point, the graph:
%
is increasing.
%
is decreasing.
%
could be increasing or decreasing.
```

Here's how this test would look when printed:

A short test

1. Consider the function $y = \dfrac{1}{\sqrt{1-x^2}}$.

   A. What is $\dfrac{dy}{dx}$ when $x = 0.6$?

      a. $\dfrac{dy}{dx} = 1.17$

      b. $\dfrac{dy}{dx} = 1.28$

   B. What is the equation of the tangent line to the graph of y above $x = 0.6$?

      a. $y = 1.17x + 0.22$

      b. $y = 1.28x + 0.34$

2. Suppose the tangent line to a graph at some point is $y = 3.4x - 2.6$. At this point, the graph:

   a. is increasing.

   b. is decreasing.

   c. could be increasing or decreasing.

3.3 Adding questions or comments to the end of a test

You may want to conclude your test with an essay question or other, non-multiple-choice questions or just a note to the students. To do this, end your test with a line containing only four percent signs %%%% followed by lines of LaTeX code containing whatever you want printed at the end of the test.

3.4 Writing a test with your own LaTeX editor

You can write a test using your own LaTeX editor, which may be more familiar and more powerful than the minimal text editor in TestMaker. Do not add the usual LaTeX preamble, `\begin{document}` or `\end{document}` commands or list-building environments. Save your file with the extension `.tmk` or just copy-and-paste text from your TeX editor into TestMaker. TestMaker will add all the necessary LaTeX commands to format and compile your document when you save-and-view your test.

3.5 Adding graphics to your test

You can add a graphic to a question or answer by (a) saving the graphic as an Encapsulated Postscript (EPS) file in the same folder as your source file, and (b) placing it in your document with the command

```
\includegraphics[height=1.0in]{filename.eps}
```

You can change the height parameter to resize the graphic on the page.

The graphical examples in this manual were created with *Mathematica*. To save a *Mathematica* graph as an Encapsulated Postscript file, click on the image, then click **File/Save Selection As** and choose EPS as the file type.

3.6 Internationalizing your Test

If you are using TestMaker with students that don't speak English, you can make TestMaker print instructions like "Print Name" or "Write your answers here" in another language. Open the Setup menu and change the text in the left column of the last part of the dialog to equivalent instructions in your language. The instructions you put there will appear on your students' tests. You only have to do this once; TestMaker will save your changes when you close and recall them the next time you use TestMaker.

3.7 For TEXperts

Before TestMaker compiles your test, it puts the following preamble on your file:

```
\documentclass[10pt]{article}
\usepackage[latin1]{inputenc}
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{graphicx}
\pagestyle{myheadings}
\begin{document}
```

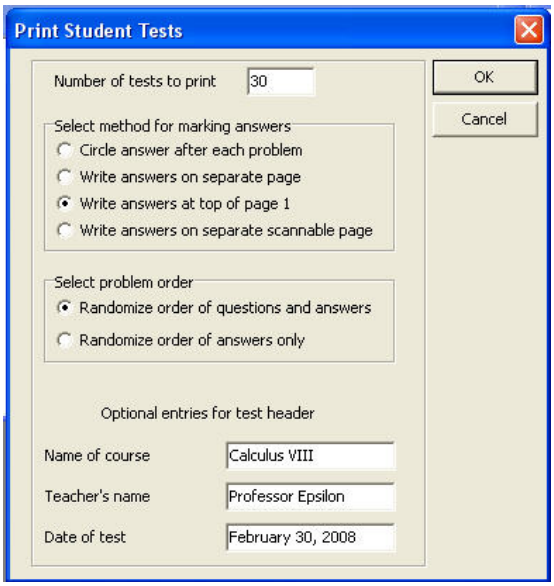
The preamble for the student test is the same. The preamble defines the symbols, fonts, formulae and graphics that you can use in your test. If you want to expand this preamble, for example to add another package, you can add additional lines through the dialog box opened by clicking **Setup**.

You can view the LaTeX code that TestMaker creates from your source file. The LaTeX file can be found in the same directory with the same name as your source file, but with the extension .tex. Your source file has the extension .tmk.

4 Printing Student Tests

Once you have compiled your test, you can print as many student tests as you need. *The source file for the test you want to print must be loaded, and the window displaying it must be the active window.* To print tests, click on **File/Print Tests for Students** or click the printer icon on the toolbar. Each test will have a unique identifying number in the header, and the answers and (optionally) the problems will appear in randomized order on each test. TestMaker remembers how it printed the tests and will grade them for you.

When you ask to print tests, TestMaker opens a dialog box where you enter information about how your tests will be printed.



To fill in the dialog box:

- Enter the number of tests to be printed.
- You have four options for student answers:
  1. Students can circle the correct answer after each question. This is easy for the students but harder for you to grade.
  2. You can print a form like the one below on a separate page for students to enter their answers. This takes extra paper but may reduce errors students make transferring answers and allows them to keep the test and just submit the answer sheet.
  3. You can print a form like the one below at the top of the first test page. This usually uses less paper than the previous option. *For either this option or the previous one, you should encourage students to detach the first page from the rest of the test. They need to submit only the first page, which reduces the amount of paper you have to handle, and when the first page was not detached some students have made errors transferring answers from succeeding pages to the first page. The errors seemed to occur because students had covered the printed alternatives when they flipped back to the first page to write their answer on the answer sheet.*
  4. You can print an answer form scannable with the program ScanTests. *This option is experimental and probably not ready for use.*

Here's a sample table that students use for answers in the second and third options:

Write your answers here													
1		2		3		4		5		6		7	
8		9		10									

- Decide whether or not the order of your questions will be randomized on each test. The order of the answers is always randomized. If you randomize the order of the questions, question groups (3.1) will be kept together.
- The dialog box has some optional fields which you can use to add items to be printed in the header of each test page. The items suggested are:
  - Course name
  - Instructor's name
  - Date of examination

Click **OK** to close the dialog box. Next you will be asked which printer to use. Select the target printer, and your tests will start to print. You will see a lot of screen activity while the tests are printing, because TestMaker creates and compiles a LaTeX file for each separate test.

Sometimes, when you print a lot of tests, TestMaker will overwhelm the buffers in the computer and the printer. Here's what I do then. I print a batch of perhaps 15-20 tests to a PDF file using the free program CutePDF. The file will have all the tests I created, one after another, each with the questions and answers in a different order. Then I print the PDF file. Sometimes I create 3-4 PDF files to get 50-60 tests for my class. The only drawback is that I can't ask the printer to print on two sides or staple each test, because when the printer prints the PDF file it does not know where one test ends and another begins.

If you find you need additional tests, just print more. TestMaker remembers the last test number and starts printing with the next number.

If you change your test in a way that invalidates tests you have already printed, you have two choices. You can change the name of your source file (use **File/Save As...**) or just print new tests from the changed source with the unchanged name. Whichever your do, dispose of the invalid tests in a secure way.

5 Grading the Tests

Did I say that TestMaker would grade your tests for you? Well—almost. Since TestMaker is not (yet) connected to an optical reader, you or your assistant will have to enter the students' answers. First, the source file for the test you want to grade must be loaded, and the window displaying it must be the active window. Once the source file is displayed, click **File/Enter Student Answers** or click the red pencil on the toolbar. In the window that appears, enter a line for each test consisting of the test-taker's name, the number of the test (found at the upper-left corner of the test), and the answers, all separated by commas. Leave blanks where there is no answer.

```
Jones,24,a,b,c,a,b,d, ,a,c
Smith,13,a,c,d, ,a,e,b,d,a
...
```

You can save your work at any time (and you should do so frequently) by clicking the **Save** at the bottom of the data entry window. When you are finished, close the data entry window by clicking **OK**, which will also save your work. If you click **Cancel**, you will lose all the work entered since you last clicked **Save**.

You can close the data entry window at any time by clicking **OK** and reopen it later. It will be filled with the results you have already entered, and you can correct these or enter more answers.

If you want to grade the tests by hand instead of entering the student answers into TestMaker, you can ask TestMaker for an answer key by clicking on **File/Print Answer Key**. This is a list of the correct answers for each student test, listed by test number.

6 Report of Scores

After you have entered your grades, you can see how your students performed on the test by clicking on **File/View Student Results** or clicking on the 3-D bar graph on the toolbar. You will get an extensive report detailing how each student answered each question and how many times the class chose each answer. The question numbers and answer letters on this report correspond to the numbers and letters on the master test no matter how the questions and answers were permuted on a student's test. Thus answer (a) is always the right answer.

You can see a sample report in Appendix B.

As a byproduct of producing this report, TestMaker also produces a comma-delimited file of results that can be loaded into your spreadsheet. Look in the test folder for a file with the extension .csv.

You can go back and forth between data entry and reporting. Viewing the report does not prevent you from entering more grades for the same test and generating another report.

A Appendix: Sample Test

The following pages contain a sample source file with calculus questions, the master test compiled from them, and a student test compiled from the same source.

```
\begin{center}
\textbf{Sample Calculus Questions}
\end{center}

\noindent \emph{You may use a non-graphing calculator, one page of notes
and unlimited amounts of scratch paper during the examination}.


%%
Differentiate
\[ y = \frac{\sin x}{x}\]
%
$\dfrac{x \cos x - \sin x}{x^2}$
%
$\dfrac{\cos x}{1}$
%
$\dfrac{x \cos x + \sin x}{x^2}$
%
$\dfrac{x \sin x - \cos x}{x^2}$

%%
Evaluate $\displaystyle\int x e^x dx$.
%
$x e^x-e^x$
%
$x e^x + e^x$
%
$x e^x$
%
$e^x - x e^x$

%%
Consider a figure consisting of a rectangle of height $h$
and width $w$ topped with a semicircle. The semicircle has
diameter $w$. Find the dimensions of the figure with
perimeter 1 that has the largest area.
%
$h = \dfrac{1}{4+\pi}$ and $w = \dfrac{2}{4+\pi}$
%
$h = \dfrac{2}{4+\pi}$ and $w = \dfrac{1}{4+\pi}$
%
$h = \dfrac{1}{4+2\pi}$ and $w = \dfrac{1}{2+\pi}$
%
$h = \dfrac{1}{2+\pi}$ and $w = \dfrac{2}{2+\pi}$
```

```
%%
What function is represented by the following graph:

\includegraphics[height = 1.0in]{x^3-x.eps}
%
$y = x^3-x$
%
$y = x^3-x^2$
%
$y = x^3+x$
%
$y = x^3+x^2$

%%
Which graph represents the function $y = x \sin x$?
%
\includegraphics[height = 0.75in]{x_sin_x.eps}
%
\includegraphics[height = 0.75in]{x^2_sin_x.eps}
%
\includegraphics[height = 0.75in]{sin_x.eps}
%
\includegraphics[height = 0.75in]{sin_x_over_x.eps}

%%
Evaluate the series $\displaystyle \sum_{i=0}^{\infty}\frac{2}{3^i}$.
%
3
%
$\dfrac{3}{2}$
%
Does not converge
%
$\dfrac{1}{2}$

%%
Does the series $\displaystyle \sum_{n=1}^\infty \frac{1}{\sqrt{n}}$
converge?
%
The series converges
%
The series does not converge
%%
Which one of the following series converges?
%
$\displaystyle \sum_{n=0}^\infty \left(  \frac{1}{n} \right) ^n$
%
$\displaystyle \sum_{n=0}^\infty  \frac{1}{n}$
%
$\displaystyle \sum_{n=0}^\infty  \frac{1}{\sin n}$
%
$\displaystyle \sum_{n=0}^\infty  \frac{1}{\ln n}$
```

```
%%
Find the area above the line $y=x+1$ and inside the circle
$x^2+y^2 = 4$.

\includegraphics[height = 1.0in]{line_and_circle.eps}
%
$4 \arctan \sqrt{7} - \dfrac{\sqrt{7}}{2}$
%
$4 \arctan \sqrt{7} + \dfrac{\sqrt{7}}{2}$
%
$4 \arctan \sqrt{3} - \dfrac{\sqrt{3}}{2}$
%
$4 \arctan \sqrt{3} + \dfrac{\sqrt{3}}{2}$

%%
Find the area above the line $y=x+1$ and inside the circle
$x^2+y^2 = 4$.

\includegraphics[height = 1.0in]{line_and_circle.eps}
%
$3.515$
%
$3.503$
%
$3.527$
%
$3.549$

%%%
\textbf{Essay Question:} Who invented calculus: Isaac Newton or Gottfried Leibnitz?
```

Sample Calculus Questions

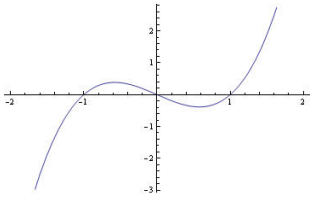
You may use a non-graphing calculator, one page of notes and unlimited amounts of scratch paper during the examination.

1. Differentiate
$$y = \frac{\sin x}{x}$$
   (a) $\dfrac{x\cos x - \sin x}{x^2}$
   (b) $\dfrac{\cos x}{1}$
   (c) $\dfrac{x\cos x + \sin x}{x^2}$
   (d) $\dfrac{x\sin x - \cos x}{x^2}$

2. Evaluate $\displaystyle\int xe^x dx$.
   (a) $xe^x - e^x$
   (b) $xe^x + e^x$
   (c) xe^x
   (d) $e^x - xe^x$

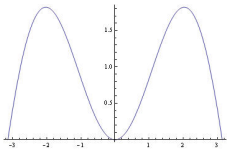
3. Consider a figure consisting of a rectangle of height h and width w topped with a semicircle. The semicircle has diameter w. Find the dimensions of the figure with perimeter 1 that has the largest area.
   (a) $h = \dfrac{1}{4+\pi}$ and $w = \dfrac{2}{4+\pi}$
   (b) $h = \dfrac{2}{4+\pi}$ and $w = \dfrac{1}{4+\pi}$
   (c) $h = \dfrac{1}{4+2\pi}$ and $w = \dfrac{1}{2+\pi}$
   (d) $h = \dfrac{1}{2+\pi}$ and $w = \dfrac{2}{2+\pi}$

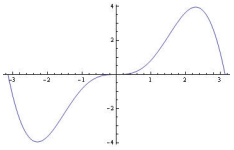
4. What function is represented by the following graph:

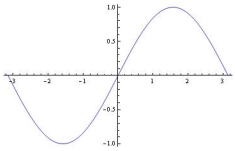


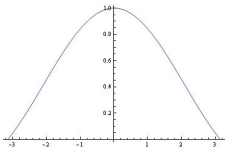
(a) $y = x^3 - x$
(b) $y = x^3 - x^2$
(c) $y = x^3 + x$
(d) $y = x^3 + x^2$

5. Which graph represents the function $y = x \sin x$?

(a) 

(b) 

(c) 

(d) 

6. Evaluate the series $\displaystyle\sum_{i=0}^{\infty} \frac{2}{3^i}$.

(a) 3
(b) $\dfrac{3}{2}$
(c) Does not converge
(d) $\dfrac{1}{2}$

7. Does the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ converge?

(a) The series converges
(b) The series does not converge

8. Which one of the following series converges?

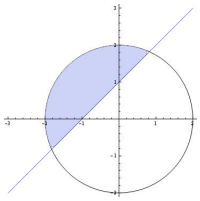
   (a) $\displaystyle\sum_{n=0}^{\infty} \left(\frac{1}{n}\right)^n$

   (b) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{n}$

   (c) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{\sin n}$

   (d) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{\ln n}$

9. Find the area above the line $y = x + 1$ and inside the circle $x^2 + y^2 = 4$.



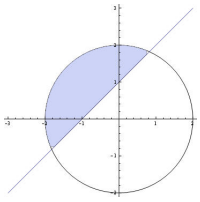
   (a) $4 \arctan \sqrt{7} - \dfrac{\sqrt{7}}{2}$

   (b) $4 \arctan \sqrt{7} + \dfrac{\sqrt{7}}{2}$

   (c) $4 \arctan \sqrt{3} - \dfrac{\sqrt{3}}{2}$

   (d) $4 \arctan \sqrt{3} + \dfrac{\sqrt{3}}{2}$

10. Find the area above the line $y = x + 1$ and inside the circle $x^2 + y^2 = 4$.



    (a) 3.515

    (b) 3.503

    (c) 3.527

    (d) 3.549

Essay Question: Who invented calculus: Isaac Newton or Gottfried Leibnitz?

Name _____

Write your answers here													
1		2		3		4		5		6		7	
8		9		10									

Sample Calculus Questions

You may use a non-graphing calculator, one page of notes and unlimited amounts of scratch paper during the examination.

1. Consider a figure consisting of a rectangle of height h and width w topped with a semicircle. The semicircle has diameter w. Find the dimensions of the figure with perimeter 1 that has the largest area.

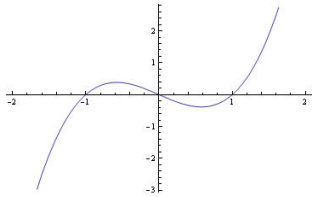
   (a) $h = \dfrac{1}{4+2\pi}$ and $w = \dfrac{1}{2+\pi}$

   (b) $h = \dfrac{2}{4+\pi}$ and $w = \dfrac{1}{4+\pi}$

   (c) $h = \dfrac{1}{4+\pi}$ and $w = \dfrac{2}{4+\pi}$

   (d) $h = \dfrac{1}{2+\pi}$ and $w = \dfrac{2}{2+\pi}$

2. What function is represented by the following graph:



   (a) $y = x^3 - x$

   (b) $y = x^3 - x^2$

   (c) $y = x^3 + x^2$

   (d) $y = x^3 + x$

3. Evaluate $\displaystyle\int xe^x dx$.

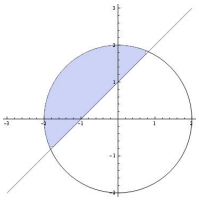
   (a) $e^x - xe^x$

   (b) $xe^x - e^x$

   (c) xe^x

   (d) $xe^x + e^x$

4. Find the area above the line $y = x + 1$ and inside the circle $x^2 + y^2 = 4$.



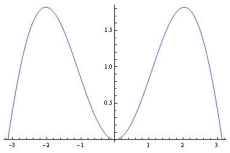
(a) $4 \arctan \sqrt{3} - \dfrac{\sqrt{3}}{2}$

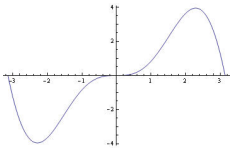
(b) $4 \arctan \sqrt{3} + \dfrac{\sqrt{3}}{2}$

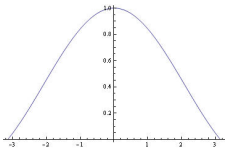
(c) $4 \arctan \sqrt{7} + \dfrac{\sqrt{7}}{2}$

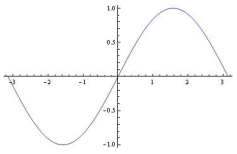
(d) $4 \arctan \sqrt{7} - \dfrac{\sqrt{7}}{2}$

5. Which graph represents the function $y = x \sin x$?

(a) 

(b) 

(c) 

(d) 

6. Does the series $\displaystyle\sum_{n=1}^{\infty} \frac{1}{\sqrt{n}}$ converge?

   (a) The series does not converge

   (b) The series converges

7. Evaluate the series $\displaystyle\sum_{i=0}^{\infty} \frac{2}{3^i}$.

   (a) $\dfrac{3}{2}$

   (b) $\dfrac{1}{2}$

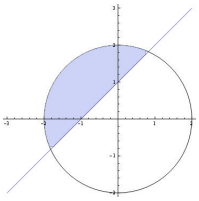
   (c) 3

   (d) Does not converge

8. Differentiate
$$y = \frac{\sin x}{x}$$
   (a) $\dfrac{x \sin x - \cos x}{x^2}$
   (b) $\dfrac{x \cos x + \sin x}{x^2}$
   (c) $\dfrac{x \cos x - \sin x}{x^2}$
   (d) $\dfrac{\cos x}{1}$

9. Which one of the following series converges?
   (a) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{\ln n}$
   (b) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{n}$
   (c) $\displaystyle\sum_{n=0}^{\infty} \left(\frac{1}{n}\right)^n$
   (d) $\displaystyle\sum_{n=0}^{\infty} \frac{1}{\sin n}$

10. Find the area above the line $y = x + 1$ and inside the circle $x^2 + y^2 = 4$.



   (a) 3.527
   (b) 3.515
   (c) 3.503
   (d) 3.549

Essay Question: Who invented calculus: Isaac Newton or Gottfried Leibnitz?

B Appendix: Sample Report of Student Scores

Here is a report of scores for randomly generated answers to the test above. The student names were randomly generated too.

Scores for longtest.tmk											
Name	1	2	3	4	5	6	7	8	9	10	Total
dklzq	c	b	d			d	b	c	d	a	1
ebhih	a		c	c	c	a		d	a		3
ebpeo	d	c	b	a	a	d	b	d		c	2
emfok	b	c	a	d	b	c	b	b	d	a	2
gwpaa	b	b	c		a	c	b		c	a	2
iuepi	d	b	b	c		c	b	d	c	a	1
jhhdu	b	c	c		b	a	b	b	c	a	2
jlonl	a	b	d	a		a			a	b	4
kyqld		c		b	b			a	d	a	2
ljglc	a		d	c	a				a	d	3
mdfrz	b	a	c	c		d		c	d	b	1
mmeam	b	a	d	c	a				c		2
nwlcs	a	b	a	c	c					d	2
oiupi	d	b	b	c	b	d		d	b	c	0
osqws	b	d	b	c	b	b		c	a	c	1
otufd	a	d	a	b	d	c	a	d	a	b	4
qugmc	a	b	c	d	a	c	b		b	a	3
qujlj		d	d	d	a	d		a	b	a	3
qzitt	d	a		b	a	a		d			3
rwili	c	d		d	c	c	b	c		c	0
sntmf	d		d	d		d		d	c	d	0
tqvsz	d	b	b	a	b	c	a	a	c	d	3
tufqw	d	c	a	a	b	a	b	b	d	c	3
updre		b	b	c	b	d	b	d	b	c	0
vdyxg	c		b	a	a	d				b	2
wgilc	b	b	b		c	d	a		c	a	2
xlpus	d	c	a	d	a	d	b	c			2
xxbmk	a	d		c	b			d	b	c	1
ygokk	b	a	d	d			b	b	b	b	1
zkygi	c	c	d	b	c		a	d	c	c	1

Totals											
Correct	7	4	5	5	9	5	4	3	5	9	
b	8	10	8	4	9	1	12	4	6	5	
c	4	7	5	10	5	7	0	5	8	8	
d	8	5	8	7	1	10	0	10	5	4	
blank	3	4	4	4	6	7	14	8	6	4	

C Appendix: LaTeX Resources

LaTeX is a document preparation system with special facilities for writing mathematics. LaTeX can change fonts and margins, create page headers, add footnotes and marginal notes, and manage all other aspects controlling the look of a document. You won't use any of these commands while in TestMaker. TestMaker handles all of them automatically. You need only understand how to create math formulas in LaTeX, and perhaps learn how to center a title or print a phrase in italics or boldface. Here are some on-line resources to help you get started.

`http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf`
`http://www.mcs.vuw.ac.nz/~david/latex/notes.pdf`
`ftp://ftp.ams.org/pub/tex/doc/amsmath/short-math-guide.pdf`
`http://www.cs.usask.ca/~wew036/latex/`
`http://www.maths.tcd.ie/~dwilkins/LaTeXPrimer/`
`http://www.math.uiuc.edu/~hildebr/tex/course/`

You don't need to know much about LaTeX to use TestMaker, but if you get interested in using LaTeX for more extensive writing tasks you will need a good book. Three of the more popular books are listed below. The first two are introductions; the third is more advanced.

- Lamport, Leslie; *LaTeX: A Document Preparation System*, 2nd edition, Addison-Wesley, 1994

- Grätzer, George; *More Math Into LaTeX*, 4th edition, Springer, 2007

- Mittelbach, Frank; Goossens, Michel; Braams, Johannes; Carlisle, David; Rowley, Chris; *The LaTeX Companion (Tools and Techniques for Computer Typesetting)* 2nd edition, Addison-Wesley, 2004