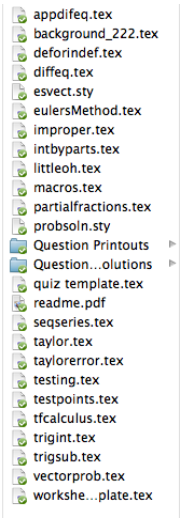
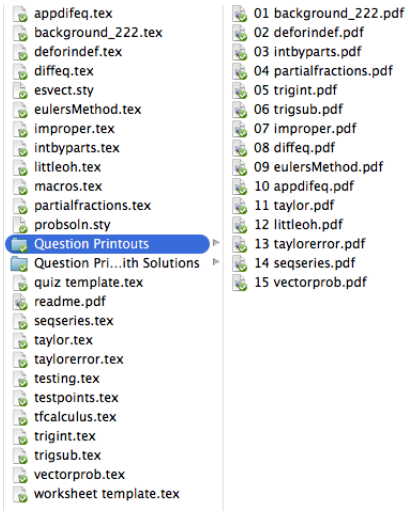
Format of the database

You should have downloaded a .zip file containing a question database for MATH 221, 222, or 234. When you unzip this folder, you should see something that looks like the following collection of files:



Most of these files are databases of questions corresponding to one of the topics covered in the class, which you should probably not alter unless you particularly enjoy debugging. The only files you will need to edit in order to use the database are quiz template.tex and worksheet template.tex. Instructions on how to edit these files are at the end of this document.

The two folders Question Printouts and Question Printouts with Solutions contain PDF copies of all of the questions in the database, broken down by topic. The first folder only contains the statements of problems, while the second contains the statements along with the solutions. If you open the Question Printouts folder, you should see a collection of PDF files that look like this:



Each of these PDF files contains a statement of the problem, along with the problem's identifier in the database in parentheses. For example, the question below was taken from a PDF in the Question Printouts with Solutions folder. The label of the problem is in parentheses and is "intbyparts:ln" and the statement of the problem is "Compute $\int \ln(x)dx$"

2. (intbyparts:ln)
Compute $\int \ln(x)dx$
Solution:

$$\begin{aligned}\int \ln(x)dx &= \int \underbrace{\ln(x)}_{\text{F(x)}} \underbrace{dx}_{\text{G'(x)dx}} \\ &= \underbrace{x}_{\text{G(x)}} \underbrace{\ln(x)}_{\text{F(x)}} - \int \underbrace{x}_{\text{G(x)}} \underbrace{\frac{1}{x}dx}_{\text{F'(x)dx}} \\ &= x\ln(x) - x + C\end{aligned}$$

To use the database, open the PDF files containing questions from the topic you are teaching and identify a collection of problems that you want to use in your class. You will need these problem labels in order to use the templates to create quizzes and worksheets.

Making a quiz or worksheet

You can use the file quiz template.tex to make quizzes and the worksheet template.tex file to make worksheets. Each of these files is broken down into sections which allow you to choose the questions you are using, whether the document is an answer key or a quiz/worksheet, and change the formatting.

1.) Input the question databases you want to use

In order to use a problem from a database, you need to include the database that contains that question into the template document. You can do this in the second section of the template, which looks like this:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Uncomment the lines below to have the questions from these files available below.  The packages are currently approximately in the order that the topics appear in the text.
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%\input{background_222}   %Background questions for 222.
%input{deforindef}        %Questions about the differences between definite and indefinite integrals
%\input{intbyparts}       %Computation of integrals using integration by parts
%\input{partialfrations}  %Computing integrals using polynomial division and partial fractions
%\input{trigint}          %Integrals of trigonometric functions
%\input{trigsub}          %Integrals computed using trigonometric substitution
%\input{improper}         %Existence, estimation and computation of improper integrals
%\input{diffeq}           %Separable and first order linear differential equations with no word problems.
%\input{eulersMethod}     %Examples of using Euler's method to estimate solutions to ODEs
%\input{appdifeq}         %Word problems using separable and first order linear differential equations.
%\input{taylor}           %Questions about Taylor polynomials and series, without error approximation
%\input{littleoh}         %Basics of little oh notation and Taylor approximation with little oh notation
%\input{taylorerror}      %Questions about Taylor error approximation and convergence of Taylor series
%\input{seqseries}        %Questions about sequences and series
%\input{vectorprob}       %Problems about basic properties of vectors
```

For example, if you wanted to use the question intbyparts:ln shown above from the integration by parts section, you would delete the % in front of the line \input{intbyparts}:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Uncomment the lines below to have the questions from these files available below.  The packages are currently approximately in the order that the topics appear in the text.
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%\input{background_222}  %Background questions for 222.
%\input{deforindef}      %Questions about the differences between definite and indefinite integrals
\input{intbyparts}       %Computation of integrals using integration by parts
%\input{partialfrations}  %Computing integrals using polynomial division and partial fractions
%\input{trigint}          %Integrals of trigonometric functions
%\input{trigsub}          %Integrals computed using trigonometric substitution
%\input{improper}         %Existence, estimation and computation of improper integrals
%\input{diffeq}           %Separable and first order linear differential equations with no word problems.
%\input{eulersMethod}     %Examples of using Euler's method to estimate solutions to ODEs
%\input{appdifeq}         %Word problems using separable and first order linear differential equations.
%\input{taylor}           %Questions about Taylor polynomials and series, without error approximation
%\input{littleoh}         %Basics of little oh notation and Taylor approximation with little oh notation
%\input{taylorerror}      %Questions about Taylor error approximation and convergence of Taylor series
%\input{seqseries}        %Questions about sequences and series
%\input{vectorprob}       %Problems about basic properties of vectors
```

2.) Determine if you are making a quiz/worksheet or an answer key

The next section of the document gives you the option of turning your quiz into an answer key. If you want to produce an answer key, uncomment the showanswers command by deleting the % in front of the \showanswers.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%  If you want to turn this into an answer key, delete the % in front of \showanswers below
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%\showanswers
```

3.) Change the header information

The next section of the template contains the header information. You should change the values inside of the brackets {} to whatever is appropriate for the class you are teaching.

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Fill in the variables below to change the header information.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\newcommand \thisclass{222}            %Put the course number here.
\newcommand \thislecture{001}          %Put the lecture number here.
\newcommand \semester{Fall 2000}       %Put the semester here.
\newcommand \quiznumber{1}             %Put the quiz number here.
\newcommand \instructions{Write neatly and show your work.  If you run out of space and need to write on the back of this sheet, please indicate that you have done so on this page.} % Put quiz instructions here.
```

The output of these choices will look something like this:

MATH 222(001) Fall 2000
Quiz 1   Name: ____________________

Write neatly and show your work. If you run out of space and need to write on the back of this sheet, please indicate that you have done so on this page.

4.) Choose the questions you want to use

The next section of the template is the place where you choose the questions that you want to use. You should put the labels of the questions that you want to use inside the brackets {} as shown in the examples below.

Quiz

For example, if you wanted to use the questions intbyparts:ln and intbyparts:arctan from the intbyparts database to make a quiz, this section should look like this:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Fill in the label of the questions you would like to use below.  Remember that you must uncomment the database file that you would like to draw questions from above.
% For example, if you want to use the question bg222:deriv1 and bg222:deriv2 from the database background_222, then you need to uncomment the \input{background_222}
%command above, and then put bg222:deriv1 into the first set of brackets and bg222:deriv2 into the second set of brackets.
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\newcommand \questionone{intbyparts:ln}                    %Put the label of question 1 here
\newcommand \questiontwo{intbyparts:arctan}                   %Put the label of question 2 here.
```

Worksheet

The worksheet template assumes that you want to make a five question worksheet. If you want a worksheet with five questions, fill in the question labels inside the brackets in the same way as you would for a quiz:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Fill in the label of the questions you would like to use below.  Remember that you must uncomment the database file that you would like to draw questions from above.
% For example, if you want to use the question bg222:deriv1 and bg222:deriv2 from the database background_222, then you need to uncomment the \input{background_222}
%command above, and then put bg222:deriv1 into the first set of brackets and bg222:deriv2 into the second set of brackets.
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\newcommand \questionone{intbyparts:ln}                    %Put the label of question 1 here
\newcommand \questiontwo{intbyparts:arctan}                   %Put the label of question 2 here.
\newcommand \questionthree{intbyparts:arcsine}                   %Put the label of question 3 here
\newcommand \questionfour{intbyparts:arccos}                  %Put the label of question 4 here
\newcommand \questionfive{intbyparts:xnlog}                   %Put the label of question 5 here
```

If you want to use fewer than five questions or to change the spacing between questions, see the last section of this document.

5.) Changing the point values for quizzes

The last section of the quiz template allows you to change the point totals for quizzes. The default setting is 20 point quizzes where each question is worth 10 points:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Fill in the number of points that each question is worth below.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\newcommand \pointsqone{10}
\newcommand \pointsqtwo{10}
```

How to use your own questions

1.) Add questions directly to the templates

In order to insert your question into a quiz or worksheet, go to the last section of the template. For quizes, you will be changing the highlighted section:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% The rest of this code makes the quiz based on your choices above.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\begin{document}
MATH \thisclass (\thislecture) \semester

\ifthenelse{\boolean{showanswers}}{\textbf{Quiz Solutions} \hspace{1.5in}}{Quiz \quiznumber \hspace{2.6in}{Name:} {\underline {\hspace{2.5in}}}}
\vspace{2pc}

\ifthenelse{\boolean{showanswers}}{Please inform your TA if you find any errors in the quiz solutions.}{\instructions}
\vspace{2pc}

\begin{problem}{\pointsqone}
\useproblem{\questionone}
\vfill
\end{problem}


\begin{problem}{\pointsqtwo}
\useproblem{\questiontwo}
\vfill
\end{problem}
```

You will need to replace the line(s) that call questions from the database with your TeX code:

```
\begin{problem}{\pointsqone}
\useproblem{\questionone}
\vfill
\end{problem}
```

For example, if we wanted to manually input the question intbyparts:ln shown above as the first question on a quiz, this section would look like this:

```
\begin{problem}{\pointsqone}
Compute $\int \ln(x)dx$.
\vfill
\end{problem}
```

If you use this method, you will have to manually do the formatting to make the answer key, as demonstrated below:

```
\begin{problem}{\pointsqone}
Compute $\int \ln(x)dx$.

\textbf{Solution}:
\begin{align*}
\int \ln(x) dx &= \int \underbrace{\ln(x)}_\textrm{F(x)} \underbrace{dx}_\textrm{G'(x)dx} \\
&= \underbrace{x}_\textrm{G(x)} \underbrace{\ln(x)}_\textrm{F(x)} - \int \underbrace{x}_\textrm{G(x)} \underbrace{\frac{1}{x} dx}_\textrm{F'(x)dx} \\
&= x \ln(x) - x + C
\end{align*}

\vfill
\end{problem}
```

The method for worksheets is essentially the same as for quizzes, but you will need to remember to add the spacing between questions. The section that you want to edit is shown below:

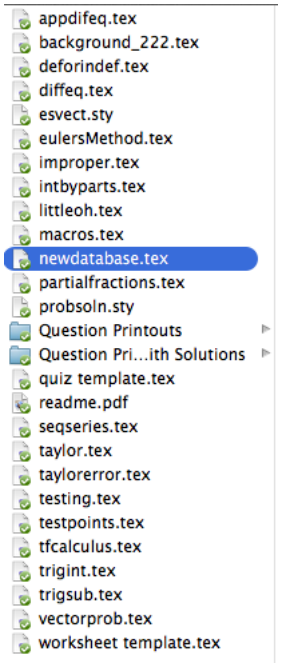
```
\begin{enumerate}
\item \useproblem{\questionone}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questiontwo}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionthree}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfour}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfive}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\end{enumerate}
```

To add your question, replace the highlighted line with \item and your code. You will need to leave the vertical spacing (\vspace{17pc}) at the end of the line so that your questions have room between them. You should experiment with different numbers in place of the 17 in order to have your questions appropriately spaced.

```
\begin{enumerate}
\item Compute $\int \ln(x) dx$. \vspace{17pc}
\item \useproblem{\questiontwo}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionthree}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfour}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfive}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\end{enumerate}
```

2.) Build your own database files

This database is built on the probsoln package, which has its own detailed readme (click here to access it). To build your own database, start a new .tex file in the same folder as the other databases:



Your new database file only needs to contain questions, which should be formatted as follows. To declare a new question, use the command \newcommand{}{}{}. The first set of brackets should contain the label of the problem, which needs to be distinct from all other problem labels in databases you intend to use and should not contain any special characters (use letters and numbers only). For example, if you wanted to create a new database file containing the question "Compute $\int \ln(x)dx$." with label newdatabase:question1 and a solution then the file should contain the following code:

```
\newproblem{newdatabase:question1}{Compute $\int \ln(x) dx$.}{
\begin{align*}
\int \arctan(x) dx &= \int \underbrace{\arctan(x)}_\textrm{F(x)} \underbrace{dx}_\textrm{G'(x)dx} \\
&= \underbrace{x}_\textrm{G(x)} \underbrace{\arctan(x)}_\textrm{F(x)} - \int
\underbrace{x}_\textrm{G(x)}\underbrace{\frac{1}{1+x^2}dx}_\textrm{F'(x)dx} \\
&= x \arcsin(x) - \frac{1}{2}\ln|1 + x^2| + C
\end{align*}
}
```

Test your code frequently with another TeX document. Most TeX editors will not be able to give you meaningful error messages because the code for the problem will be in a file other than the one you are compiling.

In order to be able to call this problem, you will need to add the database you have created to the templates. To do this, return to the section where you decide which databases to use and add the line \ input{newdatabase}:

```
%\input{background_222}  %Background questions for 222.
%\input{deforindef}       %Questions about the differences between definite and indefinite integrals
%\input{intbyparts}       %Computation of integrals using integration by parts
%\input{partialfrations}  %Computing integrals using polynomial division and partial fractions
%\input{trigint}          %Integrals of trigonometric functions
%\input{trigsub}          %Integrals computed using trigonometric substitution
%\input{improper}         %Existence, estimation and computation of improper integrals
%\input{diffeq}           %Separable and first order linear differential equations with no word problems.
%\input{eulersMethod}     %Examples of using Euler's method to estimate solutions to ODEs
%\input{appdifeq}         %Word problems using separable and first order linear differential equations.
%\input{taylor}           %Questions about Taylor polynomials and series, without error approximation
%\input{littleoh}         %Basics of little oh notation and Taylor approximation with little oh notation
%\input{taylorerror}      %Questions about Taylor error approximation and convergence of Taylor series
%\input{seqseries}        %Questions about sequences and series
%\input{vectorprob}       %Problems about basic properties of vectors
\input{newdatabase}
```

Once you have done this, you can call the question by inputting the question label you have chosen the same way they are done for the questions which come with the database. For example, to use the quesiton newdatabase:question1, you would return to the section where we chose questions and input this label:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%
% Fill in the label of the questions you would like to use below.  Remember that you must uncomment the database file that you would like to draw questions from above.
% For example, if you want to use the question bg222:deriv1 and bg222:deriv2 from the database background_222, then you need to uncomment the \input{background_222}
%command above, and then put bg222:deriv1 into the first set of brackets and bg222:deriv2 into the second set of brackets.
%
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\newcommand \questionone{newdatabase:question1}          %Put the label of question 1 here
\newcommand \questiontwo{bg222:deriv2}             %Put the label of question 2 here.
```

How to change the worksheet format

In order to change the format of the worksheet, you will need to edit the last section of the template, which looks something like this:

```
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% The rest of this code makes the quiz based on your choices above.
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
\begin{document}
MATH \thisclass (\thislecture) \semester

\ifthenelse{\boolean{showanswers}}{\textbf{Worksheet \thisdate Solutions} \hspace{1.5in}}{Worksheet \date \  \vspace{.3cm}\\
{Name:} {\underline {\hspace{2.5in}}}}
\vspace{2pc}

%Instructions go here
\ifthenelse{\boolean{showanswers}}{Please inform your TA if you find any errors in the solutions.}{\instructions}
\vspace{2pc}

\begin{enumerate}
\item \useproblem{\questionone}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questiontwo}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionthree}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfour}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfive}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\end{enumerate}

\end{document}
```

Using fewer than five questions

If you want to make a worksheet with fewer questions than five questions, you can do this by going to the bottom of the template and commenting out the command that calls the questions:

```
\begin{enumerate}
\item \useproblem{\questionone}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questiontwo}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionthree}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfour}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
%\item \useproblem{\questionfive}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\end{enumerate}
```

Changing the spacing between questions

Some questions will require more space to work than others. If you want to add or remove white space underneath a question, you can do this by changing the vertical spacing. By default it is set at 17pc:

```
\begin{enumerate}
\item \useproblem{\questionone}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questiontwo}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionthree}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfour}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\item \useproblem{\questionfive}\ifthenelse{\boolean{showanswers}}{\vspace{1pc}}{\vspace{17pc}}
\end{enumerate}
```