# *Using LATEX to Create Professional Mathematical Documents and Web Page Publication*

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1.  What do you need?  How much will it cost?
    a.  MikTeX – http://miktex.org/2.8/setup
    b.  Ghostview – http://pages.cs.wisc.edu/~ghost/gsview/index.htm
    c.  Ghostscript – http://mirror.cs.wisc.edu/pub/mirrors/ghost/GPL/current/
    d.  WinEdt 6.0 – http://www.winedt.com/winedt.html
    e.  Recommended to install in this order…
    f.  Cost?  http://www.winedt.com/registration.html ($40 for individual use)

2.  Customize a "head.tex" file
    a.  Save attachment directly in your local drive
    b.  This will be needed/used in EVERY LATEX DOCUMENT; it contains lots of formatting descriptors, specially defined commands, etc.

3.  Start the "winedt" program (under Start Menu)
    a.  This is the user-interface to LATEX
    b.  Works with several other packages to produce "finished product"

4.  Starting a **new LATEX project**
    a.  Let's produce a nice polynomial!
    b.  SAMPLE:

    > *\input{C:/head.tex}*
    > *\begin{document}*
    >
    > .
    > .
    > .
    >
    > *\end{document}*

    c.  After "begin document" type:
        i.   *$x^3-2xy^4+4y^2=0$* (the $ signs put you in "math mode")
        ii.  Hit the "LATEX" button
        iii. Use the viewer called "DVI" to see the finished product

5.  **O.Y.O. (On Your Own)** – create your own **polynomial**
    a.  Type whatever one you wish, just enclose it within $ signs
    b.  Hit "LATEX" and then "DVI" to see the results
    c.  If there are errors when you LATEX the document, you will NOT get to proceed to "DVI"

6. Add something to the mix!
   a. Lets try sine/cosine
   b. Add in: $\cos{(4x^2-2)}$
   c. Hit "LATEX" and "DVI"…

7. Let's do **fractions** and **radicals**!
   a. Add in: $\frac{4}{x^2+1}$
      i. Hit "LATEX"
      ii. Hit "DVI"
   b. Switch it to: $\dfrac{4}{x^2+1}$ (can you see a difference?)
   c. Next, add in: $\dfrac{\cos{(4x^2-2)}}{\sqrt[3]{(1+x^2)}}$
      i. Hit "LATEX"
      ii. Hit "DVI"

8. Let's try to insert a **picture, graph or chart…**
   a. Open up Microsoft Paint… and draw something
      i. Save it as "example.jpg"
      ii. And have it located in the "C drive"
   b. The command needed is: $\includegraphics{C:/example.jpg}$
      i. Use "PDFLATEX" instead of LATEX
      ii. Use "Acrobat Reader" instead of DVI
      iii. Picture MUST be in .jpg format and cropped to fit!!!

9. **How to create a sample exam…**
   a. HEADER: "MATH 2014          EXAM 1          Name _____"
   b. What do we type?
   c. *MATH 2014 \hspace*{1.5in} EXAM 1 \hspace*{1.2in} Name: \hbox to 2in {\hrulefill} \\*
      *Calculus I \\*
      *\hspace*{4.32in} Date: \hbox to 1.5in {\hrulefill} \\*
      *\bigskip*

      *(or use: \vspace*{0.5in})*
   d. next add in:
      *\begin{enumerate}*
      *\item%1*
      *Consider $f(x)=x^2-2x+1=0$*
              *\begin{enumerate}*
              *\item%a*
              *State the degree.*
              *\item%b*
              *Find the zeros of $f(x)$.*
              *\end{enumerate}*
      *\item%2*
      *Consider the graph:*
      *\includegraphics{C:/example.jpg}*

> *What is it?*
> *\end{enumerate}*
> *\end{document}*

   e.   Use "PDF2LATEX" and then "Acrobat Reader"

10.    *Additional/Advanced Topics*

   a.   **Arrays**

      i.   *$$*
          *\begin{array}{rl}*
          *y^{\prime\prime} – 4y & = 5 \\*
          *y^{\prime}(0) &= 1\\*
          *y(0) &=-2*
          *\end{array}*
          *$$*

      ii.   The "$$" put you into math mode for that whole array

   b.   **Matrices**

      i.   Suppose we wanted the matrix with:

$$\begin{array}{cc} 1 & 2 \\ -1 & 4 \end{array}$$

      ii.   We would type:
          *\left[*
          *\begin{array}{cc}*
          *1 & 2 \\*
          *-1 & 4*
          *\end{array}*
          *\right]*

      ii.   Or an augmented matrix:
          *\left[*
          *\begin{array}{cc|c}*
          *1 & 2 & 0\\*
          *-1 & 4 & -2*
          *\end{array}*
          *\right]*

      iii.   **O.Y.O. (O**n **Y**our **O**wn) – create your own augmented matrix
          Have it be for the system:

$$2x – 3y + 5z = 9$$
$$x + y + z = 0$$
$$-7x-y-10=-1$$

   c.   **Limits**

      i.   Suppose we want limit $f(x,y)=x^2/(x^2+y^3)$ as $(x,y) \rightarrow (0,0)$

      ii.   Type: *$\lim_{(x,y) \rightarrow (0,0)} \frac{x^2}{x^2+y^3}$*

      iii.   *BETTER: use in conjunction with "\displaystyle"*

d. **Tables**

   i. *\item %2*

     *$(8 \hspace{0.03 in} points)$  By studying student's results in Applied Math over a period*

     *of many years, I have determined the following information:*

     *\begin{center}*

     *\begin{tabular}{||c|c|c|c|c|c|c||} \hline \hline*

     *& & & & & & \\*

     *Grade & $50\%$ & $60\%$ & $70\%$ & $80\%$ & $90\%$ & $100\%$ \\[2ex] \hline \hline*

     *& & & & & & \\*

     *Probability & .16 & .20 & .35 & .19 & .099 & .001 \\[2ex] \hline \hline*

     *\end{tabular}*

     *\end{center}*

   ii. **O.Y.O. (O**n **Y**our **O**wn) – create your own table!

     a. Make it four columns, and two rows

     b. Make the heading (across the top) read "Number of Excuses"

     c. Make the table entries (across the top) read "1 2 3 4"

     d. Make the next column start with "Probability"

     e. And it's entries should read ".25 .10 .20 .45"

     f. Run this through "LATEX" and "DVI" to see your table!