Math 206 Project 1
Initial Due Date Friday 18 July 2014 at 6:00pm

Covers:

This project covers up through Chapter 7 of the tutorial.

What to Submit:

For this project you will need to create and submit a single script m-file called `project1.m` (all lower case!). This file should do all of the things requested in the problems below in the order specified. The answers should be placed into variables as specified. The second problem has been done for you so you see what is meant by this.

The answer to question 2 is given so that you have an idea what we're looking for. You still need to include it in your project though!

Grading Method:

Grading for this course is via an automated grading system which checks both that your answers are correct and that you used the correct method of obtaining them. This is why it is important to assign your answers to the correct variable names and use the methods specified. Once the grading is done, a text file will be uploaded to ELMS containing the results.

If there are any unexpected errors then the project will automatically earn a grade of 0 so make sure you run your m-file through Matlab and check the output before submitting! Be very careful about making sure that any necessary symbolic variables are defined in your code. The assumption should be that we will run your m-file through a clear matlab process.

Final Warning:

When you test your script m-file, type the following in Matlab:

```
>> clear all
>> project1
```

This will make sure that you've cleared out any residual defined variables and it will make sure that your code is not going to error. You have been warned!

The Problems:

1. Declare all symbolic variables and functions you will need for the project. [4 pt]
2. Calculate $e^{0.4}$. Assign the answer to `p2`. [3 pt]
   Solution: `p2 = exp(0.4)`
3. Calculate the approximate value of the tangent of the natural logarithm of 500, assuming degrees. Assign the answer to `p3`. [3 pt]
4. Metronidazole (used to treat infections) has a half life of $H = 8$ hours. Calculate the amount remaining after ten hours if you take 500mg. Note that the decay constant is $-\ln(2)/H$. Assign the answer to `p4`. [6 pt]
5. Simplify $\frac{1+\tan^2 x}{\cos x}$. Assign the answer to `p5`. [5 pt]
6. A surveyer standing at point A sights two targets, one at B and one at C. He measures that target B is 78.3 yards away, target C is 26.8 yards away and the angle between them is 21.1°. Use the Law of Cosines to find the distance between B and C. Assign the answer to `p6`. [6 pt]
7. Factor $-3x^3 - 6x^2 + 3x + 6$ Assign the answer to `p7`. [5 pt]
8. The following has several steps but only has one final answer. All angles are radians. [8 pt]
   (a) Assign j to be equal to the number of the month you were born (1=January, etc.)
   (b) Assign j to be $\sin(j)$.
   (c) Assign j to be $\cos^{-1}(j)$.
   (d) Assign `p8` to be e^j.
9. Use `solve` to solve $x^2 - 3x = 1$. Assign the answer to `p9`. [5 pt]
10. Use `solve` to solve the equation $\frac{1}{b+2} - \frac{b}{x} = b$ for b. Assign the answer to `p10`. [7 pt]
11. Use `solve` to solve the equation whose solution is the time required for an initial population of 120 units with an exponential growth constant of 0.025 to triple in size, assuming continuous growth. Assign the answer to `p11`. [10 pt]
12. Use `solve` to solve $\tan(4 - 3x) = \sqrt{3}$. Assume radians. Assign the answer to `p12`. [6 pt]
13. Use `solve` to solve the following system. [6 pt]

$$\begin{aligned} x + 2y - z &= -9 \\ 4x - y - 2z &= 1 \\ 0.5x + 3y + 3z &= 7 \end{aligned}$$

    Assign the answer to `[p13a,p13b,p13c]`.
14. Two numbers have the property that they add to 72 and the product of one with one fourth of the other is 320. Use `solve` to solve a system of equations to find the numbers. Use variable names of your choice. Assign the answer to `[p14a,p14b]`. [6 pt]
15. (a) Define the function $f(x) = x^3 - 2x^2 - 5x$ symbolically.
    (b) Assign `p15b` to $f(3)$. [5 pts]
    (c) Assign `p15c` to $f(2t - 3)$, simplified, where t is symbolic. [5 pts]
    (d) Use the `solve` command to solve $f(x) = 0$ Assign the answer to `p15d`. [5 pts]
    (e) Use the `factor` command to factor $f(x)^2$. Assign the answer to `p15e`. [5 pts]