Math 206 Project 1
First Submission due Sunday 2 February 2014 at 6:00pm
Second Submission due Monday 3 February 2014 at 6:00pm
third Submission due Sunday 5 February 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 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.

The Problems:

1. Declare all symbolic variables you will need for the project. [4 pt]
2. Calculate $e^{0.4}$. Assign the answer to `p2`. [2 pt]
   Solution: `p2 = exp(0.4)`
3. Calculate the approximate value of the natural logarithm of the tangent of 5 degrees. Assign the answer to `p3`. [2 pt]
4. Flerovium-289 (real element!) has a half-life of $\lambda = 2.6$ seconds. Calculate the amount remaining after seven seconds if you start with 37g. Note that the decay constant is $-\ln(2)/\lambda$. Assign the answer to `p4`. [4 pt]
5. Simplify $\sin^2(x) + 5\cos^2(x)$. Assign the answer to `p5`. [4 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 $x^3 - x^2 - 6x$ Assign the answer to `p7`. [4 pt]
8. The following has several steps but only has one final answer. All angles are radians. [6 pt]
   (a) Assign z to be equal to the number of the month you were born (1=January, etc.)
   (b) Assign z to be $\sin(z)$.
   (c) Assign z to be $\cos^{-1}(z)$.
   (d) Assign `p8` to be e^z.
9. Use `solve` to solve $x^2 - 6x = 7$. Assign the answer to `p9`. [4 pt]
10. Use `solve` to solve the equation $\frac{1}{b+2} - \frac{b}{x} = b$ for b. Assign the answer to `p10`. [6 pt]
11. Use `solve` to solve the equation whose solution is the time required for an initial population of 200 units with an exponential growth constant of 0.025 to double in size. Assign the answer to `p11`. [10 pt]
12. Use `solve` to solve the equation $\tan(4 - 3x) = \sqrt{3}$. Assume radians. Assign the answer to `p12`. [4 pt]
13. Use `solve` to solve the following system. [6 pt]

$$x + 2y - z = -9$$
$$4x - y - 2z = 1$$
$$0.5x + 3y + 3z = 7$$

    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. Use `fzero` to approximate a root of $f(x) = \frac{1}{x} + 5x - e^x$ near $x = 3$. Assign the answer to `p15`. [4 pt]
16. Use `fzero` with a polynomial with integer coeffecients to approximate $\sqrt{2 + 5\sqrt{8}}$. [8 pt]
    Hint: Figure out on paper the equation and a good first guess. Assign the answer to `p16`.
17. The function $f(x) = \cos(1.0032^x)$ for $x > 0$ (assume radians) has infinitely many x intercepts. Use some graphing tool (calculator, Wolfram Alpha, etc.) to find *the integer closest to the smallest positive x-intercept* and then use `fzero` to approximate this x-intercept using that integer as the initial guess. You do not need to explain how you got your initial guess. Assign the answer to `p17`. [8 pt]