2.7 Chapter 2 Exercises

1. Translate the expressions into MATLAB commands and find their values.

   (a) $5 + 18$
   (b) $\frac{32}{7}$
   (c) $\frac{4}{5} \times 8$
   (d) $\frac{3+5\times7}{6}$
   (e) $\frac{12-7}{4+8}$
   (f) $\frac{\frac{3}{4}+2}{1+2}$
   (g) $\sqrt{3^2+4^2}$
   (h) $\frac{\sqrt{2}}{2}$
   (i) $\frac{\sqrt{2}-\frac{1}{2}}{3+\sqrt{3}}$
   (j) $\sqrt{5+\sqrt{3}}$
   (k) $\frac{\sin^2\left(\frac{1}{2}\right)}{1-\cos\left(\frac{1}{2}\right)}$
   (l) $e^{\frac{\sqrt{3}}{2}}$
   (m) $\ln\left(\pi^4\right)$

2. Analyze the errors generated by the following expressions. Explain the errors (or lack of error!) and offer possible ways to correct them.

   (a) `22 + 5 -`
   (b) `log(-5)`
   (c) `x + 7`
   (d) `sin(30,45)`
   (e) `tan(pi/2)`
   (f) `Cos(0.7)`

3. Use the quadratic formula to find the zeros of the following quadratics:

   (a) $3x^2 - 6x + 2$
   (b) $x^2 + 7x + 12$
   (c) $-6x(2 + 4x) + 3$
   (d) $\frac{3}{5}x^2 + \frac{\pi}{7} - \sqrt{2}$
   (e) $5x^2 - 125$
   (f) $x^2 + 4$

   Recall that

   $$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

4. Create a plot for the following data:

x	-1	1	3	7	9	10
y	12	-4	10	8	5	2

   Your plot markers should be red circles with Linewidth of 2. Label the 'x', and 'y' axes.

5. Create a plot for the following data:

x	-1	1	3	7	9	10
$\mathbf{y_1}$	12	-4	10	8	5	2
$\mathbf{y_2}$	-2	0	3	3.5	7	9

   The y_1 markers should be blue plus signs and the y_2 markers should be red circles.

6. Plot the following functions all on the same figure from $x = -6$ to $x = 6$:

   (a) $f_1(x) = \frac{5}{3}\sin(3x)$

   (b) $f_2(x) = \frac{1}{4}x - 2$

   (c) $f_3(x) = \cos(\frac{x}{3})$

   Search the MATLAB documentation for the `legend` function, or use `help legend` at the command prompt, and add a legend to your plot with the labels f_1, f_2, f_3.

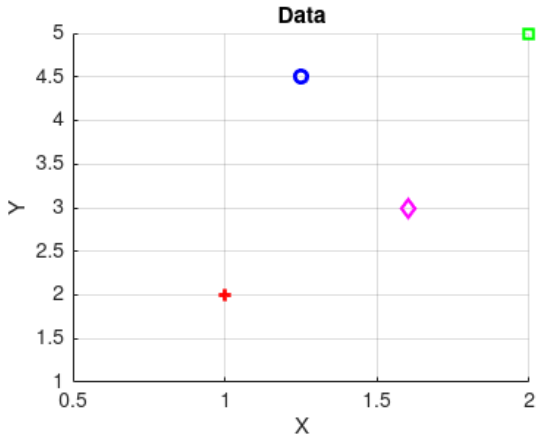
7. Plot the function

$$f(x) = \begin{cases} 3 & x \leq 2 \\ 5 - x & 2 < x \leq 6 \\ x - 7 & 6 < x \end{cases}$$

   from $x = 0$ to $x = 10$.

8. When creating a plot, for example `plot(x,cos(x))`, exactly how many points will be in our plot if we use `x = [pi: 0.2: 3*pi]`?

9. Write the commands to recreate the following plot:



10. Drop a bouncy ball from a height h_{drop} and record how high it bounces on the first bounce, h_{bounce}. Repeat for various heights and plot h_{bounce} as a function of h_{drop}. Analyze your data. Make a prediction for a drop height you haven't tried, and then test your prediction.