**Instructions:** Create script or function files as directed. To turn in:

- Your answers to #1, #2 and #3 on paper in class with the score sheet (on web) stapled on top.
- copies of the plots (saved as JPG files and emailed).
- the script file(s) of how you obtained your plots. Have a different file for each problem, and call them `hw3_1Lastname.m`, etc.

The email should have MATLAB HW3 as the subject line.

1. Plot the function $f(x) = \dfrac{4x-30}{x^2-3x-10}$ for $-10 \le x \le 10$. Note that the function has vertical asymptotes. Plot the function by dividing the domain of the function into pieces. For example, the first domain should be from $x = -10$ to near (how near? your judgement) the left of the first asymptote. All pieces of the graph should be the same color. Also, graph the vertical asymptotes with red, dotted lines. Label the axes, and put an appropriate title. Save the figure as a JPG file called `hw3_1Lastname.JPG`.

2. If a projectile is fired with an initial velocity of $v_0$ meters per second at an angle $\alpha$ above the horizontal and air resistance is assumed to be negligible, then its position after $t$ seconds is given by the parametric equations
$$x = (v_0 \cos\alpha)t \qquad y = (v_0 \sin\alpha)t - \frac{1}{2}gt^2$$
where $g$ is the acceleration due to gravity (9.8 m/s$^2$).
   (a) If a gun is fired with $\alpha = 30°$ and $v_0 = 500$ m/s, when will the bullet hit the ground? How far from the gun will it hit the ground? What is the maximum height reached by the bullet? Calculate these showing all work and graph the position of the bullet to check and demonstrate your answers. Save the figure as a JPG file named `hw3_2aLastname.JPG`.
   (b) Using `subplot`, graph the path of the bullet for 4 values of $\alpha$ (with appropriate titles!) demonstrating how your answers to part (a) may change. Save the graph as a JPG file named `hw3_2bLastname.JPG`

3. Given paths of two particles traveling in space, it would be important to know whether the particles (missles? aircraft?) collide, or if the curves just intersect.
   (a) For the two particles traveling along the space curves given by
$$\mathbf{r}_1(t) =< t^2, 7t-12, t^2 > \qquad \mathbf{r}_2(t) =< 4t-3, t^2, 5t-6 >$$
   where $t$ is time in seconds, with $t \ge 0$, graph the space curves to see if they intersect, then on paper (showing all work) decide whether they actually collide. Save the figure as a JPG file named `hw3_3aLastname.JPG`
   (b) Do the same for the curves
$$\mathbf{r}_1(t) =< t, t^2, t^3 > \qquad \mathbf{r}_2(t) =< 1+2t, 1+6t, 1+14t >$$
   and save the figure as a JPG file named `hw3_3bLastname.JPG`.

4. Graph the function $f$ and a contour plot of the function
$$f(x,y) = \sin\left(\frac{2\pi x}{60}\right)\sin\left(\frac{3\pi y}{60}\right)$$
in the domain $x \in [0, 100]$ and $y \in [0, 100]$. Graph the plots side-by-side. Save the figure as a JPG file named `hw3_4Lastname.JPG`.