1. Create the following symbolic equations:

   (a) `sq1 = x^2 + y^2 = 4`
   (b) `sq2 = 5*x^5 - 4*x^4 + 3*x^3 + 2*x^2 - x = 24`
   (c) `sq3 = sin(a) + cos(b)-x*c = d`
   (d) `sq4 = (x^3 -3*x)/(x-3) = 14`

2. Create the symbolic variables

   `a b c d x`

   and use them to create the following symbolic expressions:

   (a) `se1 = x^3 - 3*x^2 + x`
   (b) `se2 = sin(x) + tan(x)`
   (c) `se3 = (2*x^2 - 3*x - 2)/(x^2 - 5*x)`
   (d) `se4 = (x^2 -9)/(x+3)`

3. Divide `se1` by `se2`.
   (a) Multiply `se3` by `se4`.
   (b) Divide `se1` by `x`.
   (c) Add `se1` to `se3`.

4. The Antoine equation uses empirical constants to model the vapor pressure of a gas as a function of temperature. The model equation is

$$\log_{10}(P) = A - \frac{B}{C + T}$$

where

P = pressure, in mmHg,
A = empirical constant,
B = empirical constant,
C = empirical constant, and
T = temperature in °C.

The normal boiling point of a liquid is the temperature at which the vapor pressure (P) of the gas is equal to atmospheric pressure, 760 mmHg. Use MATLAB®'s symbolic capability to find the normal boiling point of benzene if the empirical constants are

$$A = 6.89272$$
$$B = 1203.531$$
$$C = 219.888$$

5. The heat capacity of a gas can be modeled with the following equation, composed of the empirical constants a, b, c, and d and the temperature T in kelvins:

$$C_P = a + bT + cT^2 + dT^3$$

Empirical constants do not have a physical meaning, but are used to make the equation fit the data. Create a symbolic equation for heat capacity and solve it for T.

6. Create plots of the following expressions for $x = -1$ to 7:

(a) $y = x^{\frac{2}{3}}$
(b) $y = \sin^2(x) - \cos^2(x)$
(c) $y = 17x^3 - 15x^2 + 5$
(d) $y = \log(x)$

Use the function `ezplot` to plot the graphs and also include a grid in each of your plots.
Use `fplot` to graph the following expressions on the same figure for x-values from -2π to 2π (you'll need to use the `hold on` command):

$$y_1 = \sin\ (x)$$
$$y_2 = \sin\ (2x)$$
$$y_3 = \sin\ (3x)$$

Assign each line a different color and line style.

7. For each of the following expressions, use the `ezpolar` plot function to create a graph of the expression, and use the `subplot` function to put all four of your graphs in the same figure. Consult the help feature to determine the appropriate syntax:

(a) $\sin^2(\theta) + \cos^2(\theta)$
(b) $\sin(\theta)$
(c) $e^{\theta/5}$ for θ from 0 to 20
(d) $\sinh(\theta)$ for θ from 0 to 20

8. Use `fplot3` to create a three-dimensional line plot of the following functions:

$$f_1\ (t) = x = t\sin\ (t)$$
$$f_2\ (t) = y = t\cos\ (t)$$
$$f_3\ (t) = z = t$$

9. Use the following equation to create a symbolic function Z:

$$Z = \frac{\sin(\sqrt{X^2 + Y^2})}{\sqrt{X^2 + Y^2}}$$

(a) Use the `fmesh` plotting function to create a three-dimensional plot of Z.
(b) Use the `fsurf` plotting function to create a three-dimensional plot of Z.
(c) Use `fcontour` to create a contour map of Z.

Use subplots to put all the graphs you create into the same figure.

10. Use MATLAB®'s symbolic functions to perform the following integrations:

(a) $\int (x^2 + x)\,dx$

(b) $\int_{0.3}^{1.3} (x^2 + x)\,dx$

(c) $\int (x^2 + y^2)\,dx$

(d) $\int_{3.5}^{24} (ax^2 + bx + c)\,dx$