MATLAB SHEET 1

1. Use MATLAB to calculate:

   a) $\left(15 - \frac{29}{7} + 3.5^3\right)^2$

   b) $2.7 \times 3.2 + \frac{\sqrt{17}}{5} - 2.5^{5/3}$

2. Define the variable z as z = 3.4; then evaluate:

   a) $0.45z^4 + 2.14z^2 - 173.5z - 87.3$

   b) $\left. (z^3 - 17) \middle/ \left(\sqrt[3]{z^2} + 13.8\right) \right.$

3. Use MATLAB to make the following calculations, for $x = 2.3$ and $y = 4.7$

   a) $\left(1 - \frac{1}{x^5}\right)^{-1}$ **b)** $3\pi x^2$

   c) $\frac{3y}{4x-8}$ **d)** $\frac{4(y-5)}{3x-6}$

4. Define two variables: $\alpha = \pi/9$, and $\beta = 2\pi/7$. Using these variables, show that the following trigonometric identity is correct by calculating the values of the left and right sides of the equation.

$$\tan(\alpha + \beta) = \frac{\tan\alpha + \tan\beta}{1 - \tan\alpha\tan\beta}$$

5. Use MATLAB to create a column vector x having 6 values between 0 and 15 (including the endpoints 0 and 15). Create an array A whose first column contains the vector x, the second column contains values $2x$ and the third column contains the values $3x$ - 5.

6. Define a MATLAB function to calculate the perimeter of an ellipse with a $= 18\ in.$ and b $= 7\ in.$ given by the following equation:

$$p = \pi[3(a + b) - \sqrt{(3a + b)(a + 3b)}]$$

7. Use two methods to create the vector x having a regular spacing of 0.2 starting at 2 and ending at 14.

8. Type this matrix in MATLAB and use MATLAB to carry out the following instructions.

$$\begin{bmatrix} 15 & 5 & -4 & 1 \\ 3 & 7 & 5 & 12 \\ -5 & 9 & 10 & 3 \\ 6 & 13 & 8 & 11 \end{bmatrix}$$

a) Create a 4×3 array B consisting of all elements in the first through third columns of A.

b) Create a 3×4 array C consisting of all elements in the second through fourth rows of A.

c) Create a 2×3 array D consisting of all elements in the last two rows and the first three columns of A.

9. Use MATLAB to plot the polynomial $y = 3x^4 - 5x^3 - 28x^2 - 5x + 200$ on the interval $-3 \le x \le 3$. Put labels on x and y axes.

10. Plot the function $y = 3x^3 - 26x + 10$, and its first and second derivatives, for $-2 \le x \le 4$, all in the same plot.

11. Use MATLAB to plot the function $y = 6x^3 + 22x^2 - 14x + 20$, and its first derivative on two subplots. Put labels on both horizontal and vertical axes.

12. Consider the following function:
$$y = x^5 - 12x^4 + 40x^3 - 17x^2 - 71x + 35$$
Write a script file to:

a) Calculate the value of this function at $x = 9$

b) Plot this function over the period $-1 \le x \le 6$

13. Write a function file (name it ffff) for the function $y(x) = \frac{x^4\sqrt{3x+5}}{(x^2+1)^2}$

Use the function to calculate: y(x) for x = 3 and x = 7

14. Repeat the previous problem using anonymous function.

15. Write a for loop to display N asterisks (*), one on each line, where N is a number given at the beginning of your script by the user.