

1. Given a vector v , write one line of Matlab code that returns its 1st, 2nd, and 9th elements.

$$v([1, 2, 9])$$

2. Given a 3×5 matrix A , write one line of Matlab code that sets its third column to a vector with elements 5, 7, and 2.

$$A(:, 3) = [5; 7; 2]$$

3. Write one line of Matlab code that creates an anonymous function that computes the value of the polynomial $4x^3 + 3x^2 - 2x - 7$ for an input argument x .

$$f = @(x) 4*x^3 + 3*x^2 - 2*x - 7$$

4. How would you use Matlab and the anonymous function from problem 3 to find a numerical solution to the equation $4x^3 + 3x^2 - 2x - 7 = 0$? One line of code should do it.

$$f_{\text{solve}}(f, 1) \quad \text{my initial guess for the solution is } x=1$$

5. Write a few lines of Matlab code that would plot $y = e^{-4x} \sin(2x)$ versus x for $-2 \leq x \leq 2$ as a green line with a superimposed grid. Label your axes.

$$x = \text{linspace}(-2, 2, 100);$$

$$\text{plot}(x, \exp(-4*x) .* \sin(2*x), 'g');$$

$$\text{xlabel}('x')$$

$$\text{ylabel}('y = e^{-4x} \sin(2x)')$$

$$\text{grid on}$$

6. Write one line of Matlab code that evaluates to 1 (true) if x is less than 4 and y greater than or equal to 6, and 0 (false) otherwise.

$$x < 4 \ \&\& \ y \geq 6$$

7. Write a few lines of Matlab code that would evaluate the following sum for the value $x = \pi/6$.

$$\sum_{n=0}^{20} (-1)^n \frac{x^{2n}}{(2n)!}$$

$$n = 0:20;$$

$$x = \pi/6;$$

$$\text{sum}((-1).^n .* x.^{(2*n)} ./ \text{factorial}(2*n))$$

8. Write Matlab code that would solve the system of equations.

$$3x + y + 2z - 6 = 0$$

$$9z - x - 8 = 0$$

$$5y - 4x - 1 = 0$$

$$3x + y + 2z = 6$$

$$-x + 9z = 8$$

$$-4x + 5y = 1$$

$$A = [3 \ 1 \ 2; -1 \ 0 \ 9; -4 \ 5 \ 0]$$

$$b = [6; 8; 1]$$

$$A \setminus b$$

9. Write a Matlab function that computes the mean (i.e. average) of the components of a vector x according to the formula

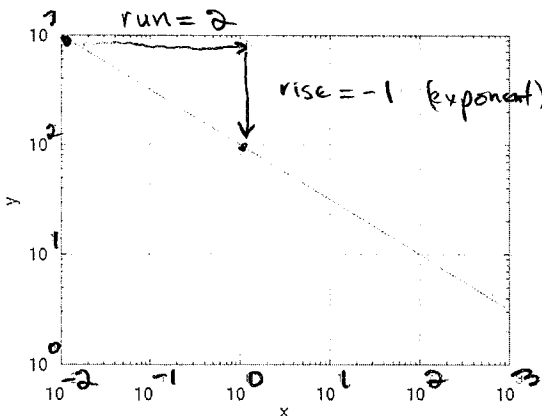
$$\text{mean}(x) = \frac{1}{N} \sum_{i=1}^N x_i$$

where N is the length of the vector. Your function should evaluate this sum directly using a for loop, not by calling Matlab's sum or mean function.

```
function m = mean(x);
% compute mean of components of input vector x

N = length(x);
m = 0;
for i = 1:N
    m = m + x(i);
end
m = m/N;
end
```

10. What is y as a function of x ? Give an explicit formula for $y(x)$ with specific numerical constants.



$$\log y = m \log x + b$$

$$\text{where } m = \frac{\text{rise}}{\text{run}} = \frac{-1}{2}$$

$$\log y = -\frac{1}{2} \log x + b$$

$$y = 10^{-\frac{1}{2} \log x + b}$$

$$= 10^b (10^{\log x})^{-1/2}$$

$$y = c x^{-1/2}$$

$$\text{at } x = 10^0 = 1, y = 100, \text{ so } c = 100$$

$$y = 100 x^{-1/2}$$