>> format compact

**I. Vector Creation Exercise**

>> x = [5,2,8,9]

x =

5 2 8 9

>> x = 1:2:9

x =

1 3 5 7 9

>> x = (1:2:11)'

x =

1

3

5

7

9

11

V-1:2:9

**II. Vector Addressing Exercises**

>>

>> y=6:-2:-6

y =

6 4 2 0 -2 -4 -6

>> y(5)

ans =

-2

>> y(end-2:end)

ans =

-2 -4 -6

>> y(5:7)

ans =

-2 -4 -6

**III. Vector Calculations Exercise**

>> Vs = V.^2

Vs =

1 9 25 49 81

>> Vs./V

ans =

1 3 5 7 9

>> (V.\*Vs)/12

ans =

0.0833 2.2500 10.4167 28.5833 60.7500

**IV. Vector Script Exercise:**

>> r1=[2,2,6,6]

r1 =

2 2 6 6

>> h1 =[1, 4, 1, 4]

h1 =

1 4 1 4

>> r2 = 1:4

r2 =

1 2 3 4

What happens in each case:

1. Two vectors input: This case an element-by-element calculation is completed between the values in the two vectors. Resulting in a separate answer for each element in the original vectors.
2. One vector and one scalar: The single scalar is combined with each element in the vector input resulting in one answer for each element in the input vector.

**Grading note:** most any student attempt to describe what happened should get full credit. The goal of here is simply to keep the students thinking about what they are doing.

>> CylScript2

Enter the radius of the cylinder: r1

Enter the height of the cylinder: h1

Volume of Cylinder (cubic meters):

V =

12.5664 50.2655 113.0973 452.3893

Surface Area of Cylinder (square meters):

SA =

37.6991 75.3982 263.8938 376.9911

>> CylScript2

Enter the radius of the cylinder: r2

Enter the height of the cylinder: 4

Volume of Cylinder (cubic meters):

V =

12.5664 50.2655 113.0973 201.0619

Surface Area of Cylinder (square meters):

SA =

31.4159 75.3982 131.9469 201.0619

**V. Problem: Vector Capable Script with Interactive Input**

For lab 1 you developed a script to calculate the area and perimeter of a shape consisting of a rectangle and a semicircle. Convert this script to:

* + use interactive input (using the input function) for L & W, and
  + allow vector input (by adding dot operators where needed). Be sure to note vector capability in the comments and/or input prompts. See example in Figure 1.

Include execution for three input cases:

1. L and W are both scalars
2. L and W are equal length vectors
3. L is a vector and W is a scalar

**Script**

% Program File Name: Shape.m

% Written by: S. Scott Moor Date Created: January 2019

% Purpose of Script: This script calculates the area and parameter of a

% shape consisting of a rectangle and a half circle attaching to the

% length of the rectangle based on the width and length of the rectangle.

% This script is capable of accepting vector input to allow calculation of

% several cases at once. Inputs, L & W must be two scalars, two equal-length

% vectors, or a scalar & a vector.

%

% Variable = description [units]

% Input: L = Length of rectangle/diameter of semicircle [Length Units]

% W = Width of rectangle [same Length Units]

% Output: A = Area of shape [Length Units Squared]

% P = Parameter of shape [Length Units]

% Input Section (hard coded)

L = input('What is the length of the rectangle (& diameter of the circle)? ');

W = input('What is the width of the rectangle? ');

% Calculation and output of Area

disp('The area of the figure is:')

A = L.\*W + (pi\*L.^2)./8

% Calculation and output of Parameter

disp('The perimeter of the figure is:')

P = 2\*W+ L +1/2\*pi\*L

**Notes:**

* To make this function work with vectors, only the area formula needs dot operators. This is because it is a linear equation where vectors are only combined with scalars except by addition. It is OK to put in more dot operators than necessary (just not on + or -)
* The program calculation was validated in Lab 1. It can be repeated here but does not need to be except to show that the script runs with the three cases requested.
* In the execution below the third case for both vector solutions (b & c) is the same case as the scalar solution (part a) and all three match.

**Execution**

>> % a. Input of two scalers

>> ShapeV

What is the length of the rectangle (& diameter of the circle)? 6

What is the width of the rectangle? 3

The area of the figure is:

A =

32.1372

The perimeter of the figure is:

P =

21.4248

>> % b. Input of two vectors

>> ShapeV

What is the length of the rectangle (& diameter of the circle)? [4 4 6 6]

What is the width of the rectangle? [3 4 3 4]

The area of the figure is:

A =

18.2832 22.2832 32.1372 38.1372

The perimeter of the figure is:

P =

16.2832 18.2832 21.4248 23.4248

>> % c. Input with a scalar and a vector

>> 3

ans =

3

>> ShapeV

What is the length of the rectangle (& diameter of the circle)? 6

What is the width of the rectangle? [1 2 3 4]

The area of the figure is:

A =

20.1372 26.1372 32.1372 38.1372

The perimeter of the figure is:

P =

17.4248 19.4248 21.4248 23.4248