1. Equivalent Resistance Problems: Include the following elements:
	1. **Equation & Hand Calculation for Equivalent Resistance:**

R1 + R2 + R3 in series/ Parallel Combination

1) formula used: $R\_{e}=\left(\frac{1}{^{1}/\_{R1} + ^{1}/\_{R2}}\right) + R3$

 2) input values R1 = 487 Ω, R2 = 996 Ω, R3 = 12,900 Ω

 3) Calculation: $R\_{e}=\left(\frac{1}{^{1}/\_{487} + ^{1}/\_{996}}\right) + 12,900=13,227 Ω $

|  |
| --- |
| **Other Possible Setups (students are only required to come up with one)**  |
| **Configurations**  + means in series  | means parallel | **Formula**  | **Total Resistance (Ω)** |
| **(1 + 2) | 3** | $$R\_{e}=\left(\frac{1}{^{1}/\_{(R1+R2)} + ^{1}/\_{R3}}\right)$$ | 1,330 |
| **(1 + 3) | 2** | $$R\_{e}=\left(\frac{1}{^{1}/\_{(R1+R3)} + ^{1}/\_{R2}}\right)$$ | 927 |
| **(2 + 3) | 1** | $$R\_{e}=\left(\frac{1}{^{1}/\_{(R2+R3)} + ^{1}/\_{R1}}\right)$$ | 471 |
| **1 | 3 + 2** | $$R\_{e}=\left(\frac{1}{^{1}/\_{R1} + ^{1}/\_{R3}}\right) + R2$$ | 1,465 |
| **2 | 3 + 1** | $$R\_{e}=\left(\frac{1}{^{1}/\_{R2} + ^{1}/\_{R3}}\right) + R1$$ | 1,412 |

* 1. **Series Parallel Network Diagram:** A computer drawn network schematic (e.g. drawn in Multisim) showing this network. Properly format as a figure with caption.



**Figure 1:** Schematic Diagram of the Combined Series and Parallel Network. The meter in this diagram shows the location of the equivalent resistance measurement/calculation.

* 1. **Series Parallel Network Equivalent Resistance:** A script and its execution to calculate the equivalent resistance of the network. Use the script template. Compare to hand calculation.

**Code:**

% Program File Name: Resist2.m

% Written by: S. Scott Moor Date Created: Sept. 7, 2018

% Purpose of Script: This program calculates the total resistance of

% three resistors in a combined series/parallel arrangement where

% (R1 & R3 are in parallel) and in series with R2

%

% Variable = description [units]

% Input: R1, R2, R3 = Individual resistor values [Ohms]

% Output: Req = Resistance for combined arrangement [ohms]

% Input Section: Resistor values (hard coded)

disp('Resistance Values [ohms]')

R1 = 487;

R2 = 996;

R3 = 12900;

disp([R1, R2, R3])

% Calculations and Output: Equivalent Resistance of Combined arrangement.

disp('Combined Series/Parallel Equivalent Resistance')

Re = 1/(1/R1 + 1/R2) + R3

**Execution:**

Resistance Values [ohms]

 487 996 12900

Combined Series/Parallel Equivalent Resistance

Re =

 1.3227e+04

**Matches hand calculation!**

1. Area and Parameter of a Compound Shape: the additional script problem should include:
	1. **Equations:** include clear presentations of the two equations (for area and for parameter)

Area: A = LW + ½ π(L/2)2 = LW + π(L)2/8

Parameter: P = 2W + L + ½ πL

* 1. **Hand Calculation**: clearly present the calculation of area and parameter for W = 2 and L = 6.

 Area = (2\*6) + π(6)2/8 = 12 + 14.14 = 26.14

 Parameter = 2\*2 + 6 + π(6)/2 = 4 + 6 + 9.42 = 19.42

* 1. **Script & its Execution:** Include a print out of the script and a copy of its execution in the command window. This print out must include the call to the script and the result of execution.

**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.

%

%

% 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 = 6;

 W = 2;

% 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 parameter of the figure is:')

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

**Execution**

**>> Shape**

**The area of the figure is:**

**A =**

 **26.1372**

**The parameter of the figure is:**

**P =**

 **19.4248**

**Results match hand calculation with in rounding**

**Notes on grading:**

* There will be a wide variation in student submittals, this solution is just an example of one approach. However, students should hit the rubric expectations
* This is their first turn in be encouraging while pushing to the next level.
* Do be on the lookout for direct copying in either code or text. If copying is expected, grade normally (but keep scores on the rubric sheets) and let your instructor know what you have seen. They will decide how to handle it.
* Do email or stop by if you have questions or specific issues.