

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO

- ❖ Write your name below on the space provided.
- ❖ This test has a total of 9 pages. Feel free to tear off the last 3 pages
- ❖ Work the problem in the space provided. If you need more space, write on the back of the test.
- ❖ To insure maximum credit, show your work. In general, full credit will not be given for unsupported answers.
- ❖ Look only at your test. Don't give me the impression that you are cheating.
- ❖ Be sure to write neatly. If I cannot read what was written, do not expect the problem to be graded.
- ❖ If you finish early, go over the test again.

Good luck!

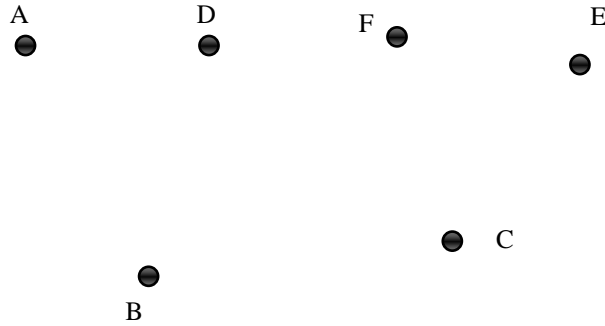
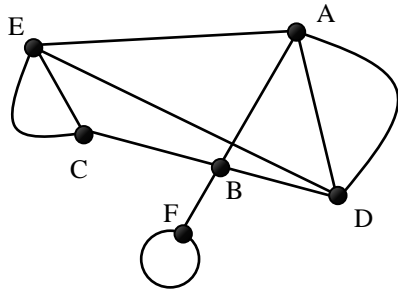
Number	Maximum	Score
1	4	
2	16	
3	6	
4	14	
5	4	
6	6	
7	8	
8	12	
9	6	
10	6	
11	6	
12	6	
13	6	
Total	100	

Name _____

Circle Final Answers

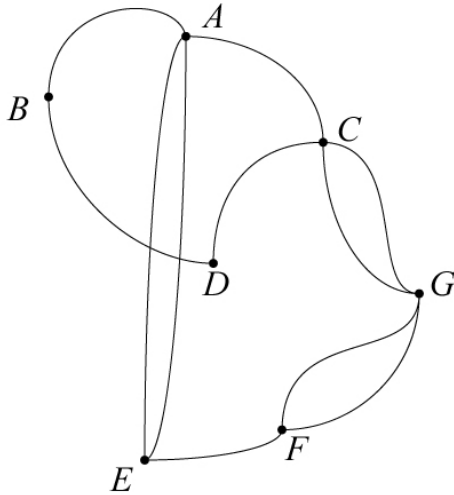
Be sure to show all unit fractions as needed.
Round only the final answer to two places as needed.

1) (4 points) Draw an equivalent graph to the given graph below by connecting the vertices:

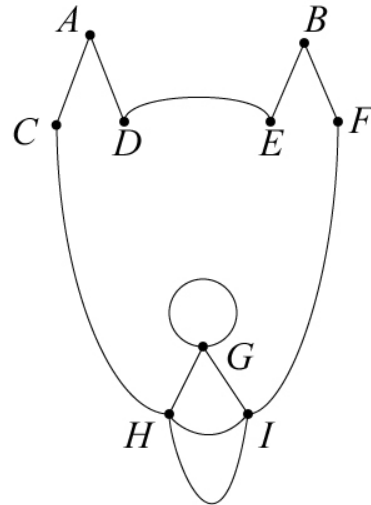


2) (8 points each) For the following graphs below, label each vertex with its degree. Also, determine if there is an Euler Circuit, Euler Path, or neither. **If there is an Euler Circuit or Euler Path, give an example of one.** If neither, explain why not:

a)



b)



3) (3 points each) Draw a graph that meets the following requirements or explain why the graph cannot exist.

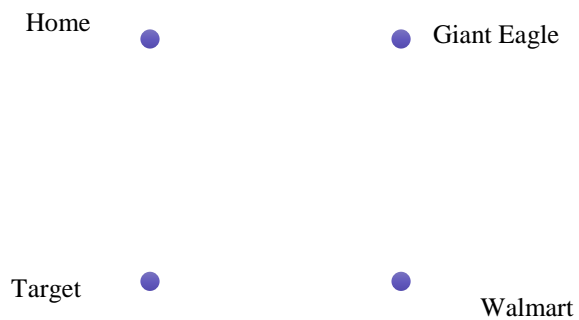
a) A connected graph that has three even degree vertices and no odd degree vertices and where the total degree is 12:

b) A graph of 5 vertices with a total degree of 9:

4) Mike needs to do some shopping the day after Halloween to buy candy to give away for next year. He finds the distances between the stores that he plans on visiting. The distances are in miles:

	Home	Giant Eagle	Target	Walmart
Home	X	2.9	2.6	3.2
Giant Eagle	2.9	X	4	3.6
Target	2.6	4	X	7.6
Walmart	3.2	3.6	7.6	X

a) (3 points) Based on the information in the chart, draw a weighted graph below:



b) (7 points) List the three unique Hamilton Circuits for this graph and find the corresponding total weight. According to the Brute Force Method, which Circuit should Mike choose?

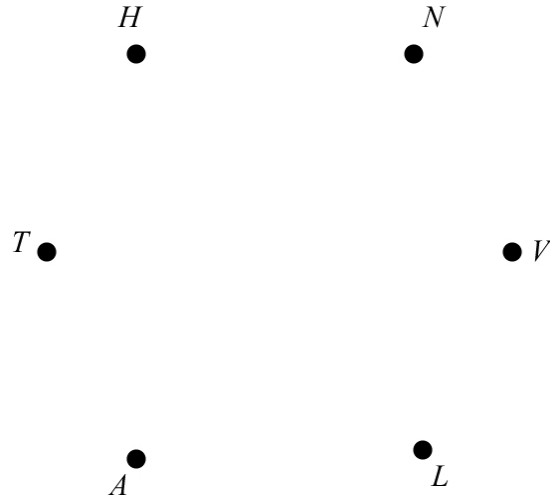
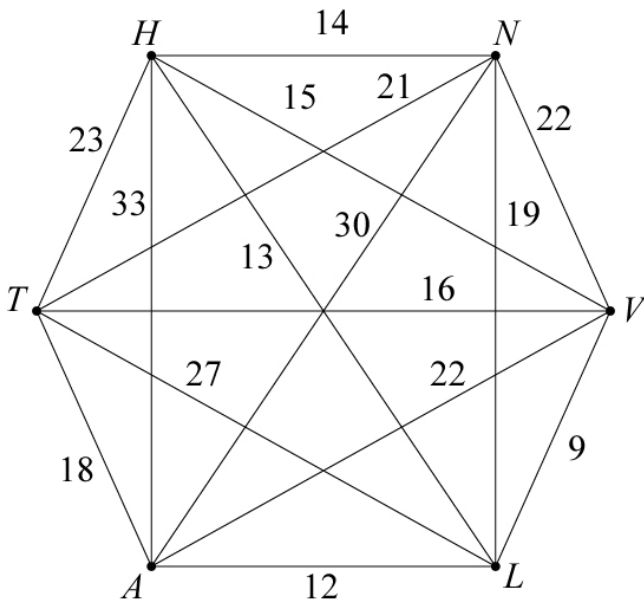
c) (4 points) For the same graph in part *a*, solve the problem using the Nearest Neighbor Method:

5) (2 points each) Define the following terms. Examples will not be accepted for credit:

a) Loop

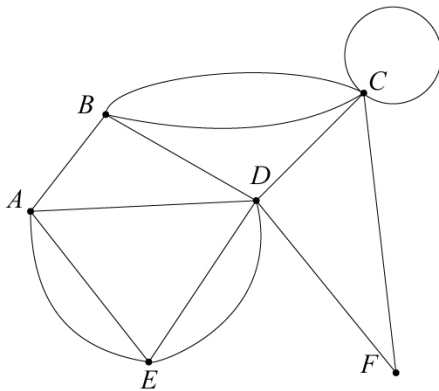
b) Bridge

6) (6 points) For the weighted graph below, draw a minimal spanning tree. Also, declare what the minimal weight is:



7) (2 points each) For the following graph, select the **best** answer from the following list. Not all terms will be used:

Path Circuit Euler Path Euler Circuit Hamilton Path Hamilton Circuit



- a) *ABCCFDEA* _____
- b) *BCFDEAB* _____
- c) *FDEABC* _____
- d) *FDEAB* _____

8) (3 points each) Convert as directed:

a) 12 yards to feet:

b) 110 inches to centimeters:

c) 12 feet to millimeters:

d) 3.1415 km to mm:

9) (6 points) During the 2016 Rio Olympics, Usain Bolt ran at a top speed of 27.7 miles per hour. How fast is this in meters per second?

10) (6 points) One curtain panel measures 42 inches by 78 inches. If the seamstress will use fabric that costs \$20 per square yard, how many square yards does she need to make **two curtains** and how much will it cost for both? Do not round until the very end of the problem.

TABLE 5.1.1 Length in the English System

12 inches (in.) = 1 foot (ft.)
3 feet (ft.) = 1 yard (yd.)
36 inches (in.) = 1 yard (yd.)
5280 feet (ft.) = 1 mile (mi.)

TABLE 5.1.3 English and Metric Equivalencies and Approximations for Length

1 inch (in.) = 2.54 cm
1 foot (ft.) = 30.48 cm
1 yard (yd.) \approx 0.914 meters (m)
1 mile (mi.) \approx 1.609 kilometers (km)

TABLE 5.1.2 Common Metric Prefixes

Prefix	Symbol	Meaning
kilo	k	$1000 \times$ base unit
hecto	h	$100 \times$ base unit
deka	da	$10 \times$ base unit
Base unit		
deci	d	$\frac{1}{10} \times$ base unit
centi	c	$\frac{1}{100} \times$ base unit
milli	m	$\frac{1}{1000} \times$ base unit

TABLE 5.2.1 Area in the English System

1 square foot (1 sq. ft. or 1 ft. ²) = 144 square inches (144 sq. in. or 144 in. ²)
1 square yard (1 sq. yd. or 1 yd. ²) = 9 square feet (9 sq. ft. or 9 ft. ²)
1 acre = 43,560 square feet or 4,840 square yards
1 square mile (1 sq. mi. or 1 mi. ²) = 640 acres

TABLE 5.2.2 Area in the Metric System

1 square centimeter (1 cm ²) = 100 square millimeters (100 mm ²)
1 square meter (1 m ²) = 10,000 square centimeters (10,000 cm ²)
1 square kilometer (1 km ²) = 1,000,000 square meters (1,000,000 m ²)

TABLE 5.2.3 English and Metric Approximations for Area

1 square inch (in. ²)	≈ 6.45 square centimeters (cm ²)
1 square foot (ft. ²)	≈ 0.093 square meters (m ²)
1 square yard (yd. ²)	≈ 0.84 square meters (m ²)
1 square mile (mi. ²)	≈ 2.56 square kilometers (km ²)
1 acre	≈ 0.405 hectare (ha)

TABLE 5.2.5 Capacity and Volume in the English System

Volume in Cubic Units	Capacity
1 cubic yard	≈ 200 gallons (gal.)
1 cubic foot	≈ 7.48 gallons
231 cubic inches	≈ 1 gallon

TABLE 5.2.8 Volume and Capacity in the Metric System

Volume in Cubic Units	Capacity
1 cubic centimeter (cm ³)	= 1 milliliter (mL)
1 cubic decimeters (dm ³) = 1000 cm ³	= 1 liter (L)
1 cubic meter (m ³)	= 1 kiloliter (kL)

TABLE 5.2.4 Volume in the English System

1 cubic foot (1 ft. ³)	≈ 1728 cubic inches (1728 in. ³)
1 cubic yard (1 yd. ³)	= 27 cubic feet (27 ft. ³)

TABLE 5.2.6 Capacity and Volume in the English System

2 pints (pt.)	= 1 quart (qt.)
4 quarts (qt.)	= 1 gallon (gal.)
1 gallon (gal)	= 128 fluid ounces (fl. oz.)
1 cup (c.)	= 8 ounces (oz.)

TABLE 5.3.1 Weight in the English System

16 ounces (oz.)	= 1 pound (lb.)
2,000 pounds (lb.)	= 1 ton (T.)

TABLE 5.3.3 English and Metric Equivalencies and Approximations for Weight

2.2 pounds	≈ 1 kilogram
2200 pounds	≈ 1 metric tonne (t) = 1000 kilograms
1 ounce	≈ 28.35 grams

$$1 \text{ L} = 1.0567 \text{ qt}$$

$$1000 \text{ cm}^3 = 1 \text{ L} = 1 \text{ kg}$$

TABLE 5.3.4 Volume, Capacity, and Weight of Water in the Metric System

Volume in Cubic Units	Capacity	Weight
1 cubic centimeter	= 1 milliliter (mL)	= 1 g
1 cubic decimeters = 1000 cm ³	= 1 liter (L)	= 1 kg
1 cubic meter	= 1 kiloliter (kL)	1000 kg = 1t

FORMULA TO CONVERT FROM CELSIUS TO FAHRENHEIT

$$F = \frac{9}{5}C + 32$$

FORMULA TO CONVERT FROM FAHRENHEIT TO CELSIUS

$$C = \frac{5}{9}(F - 32)$$

FORMULA TO CONVERT FROM CELSIUS TO KELVIN

$$K = C + 273.15$$

FORMULA TO CONVERT FROM KELVIN TO CELSIUS

$$C = K - 273.15$$