

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.
- ❖ 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!

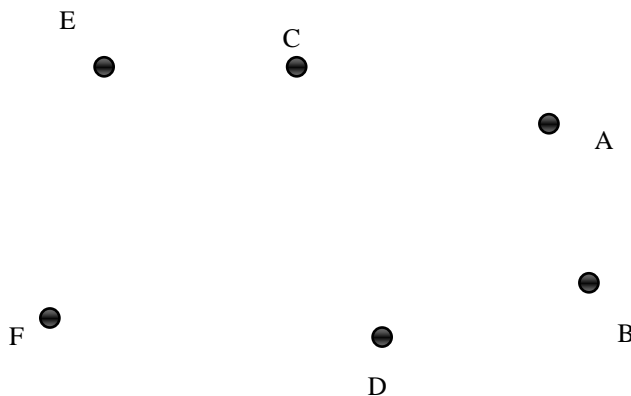
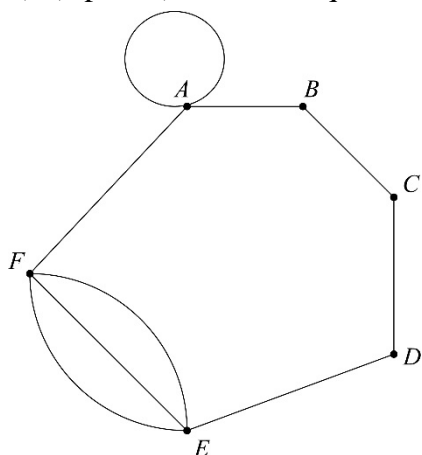
Number	Maximum	Score
1	4	
2	3	
3	16	
4	8	
5	14	
6	6	
7	4	
8	8	
9	6	
10	3	
11	5	
12	5	
13	3	
14	9	
15	6	
Total	100	

Name \_\_\_\_\_

**Circle Final Answers**

Feel free to tear off the last three pages. I do not need them back!

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

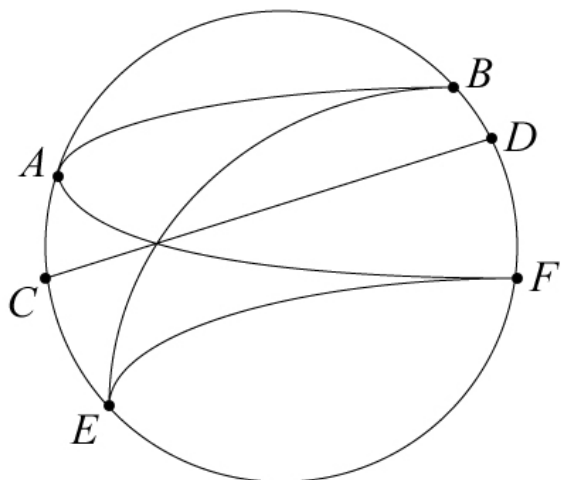


2) (3 points) Draw a graph that represents the following situation:

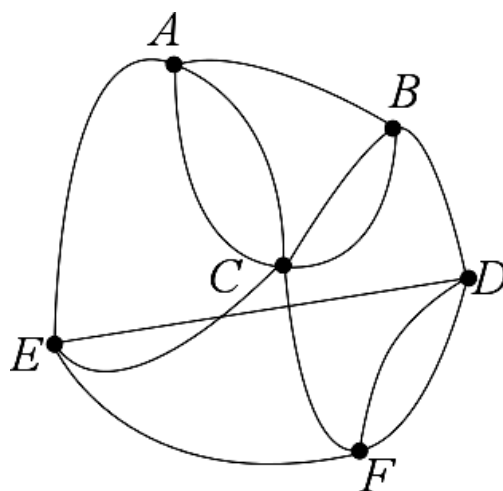
*Roberta belongs to two clubs. The first club has 3 other members and the second club has 2 other members. Roberta is the only person that belongs to both clubs*

3) (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 there is neither, explain why not:

a)



b)



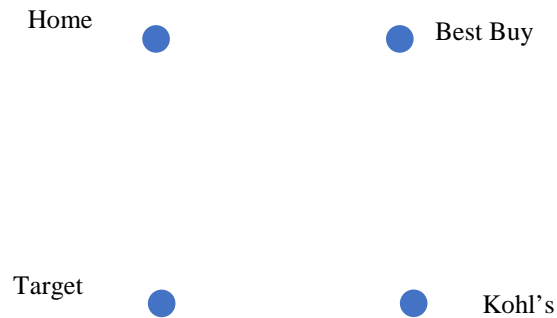
4) (4 points) Draw a graph that meets the following requirements or explain why the graph cannot exist.

- a) A connected graph with only 3 vertices, all of them even degree, where the total degree is 10:
- b) A graph that contains a bridge and has an Euler Circuit.

5) Mike needs to do some shopping on Black Friday to get some amazing deals. He finds the distances between the stores that he plans on visiting. The distances are in miles:

	Home	Best Buy	Target	Kohl's
Home		8.6	9.1	5.2
Best Buy	8.6		2.2	3.6
Target	9.1	2.2		4.6
Kohl's	5.2	3.6	4.6	

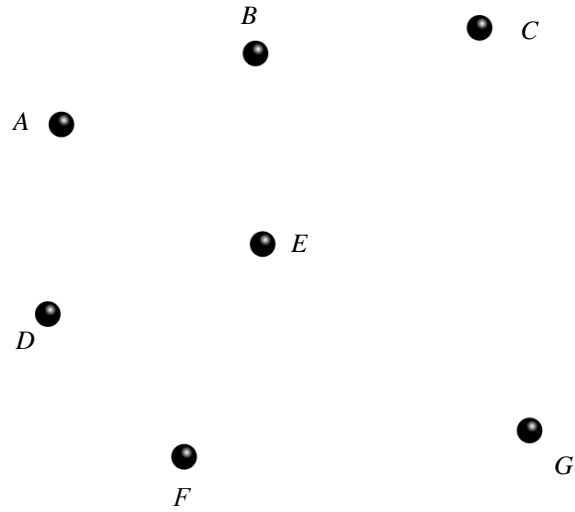
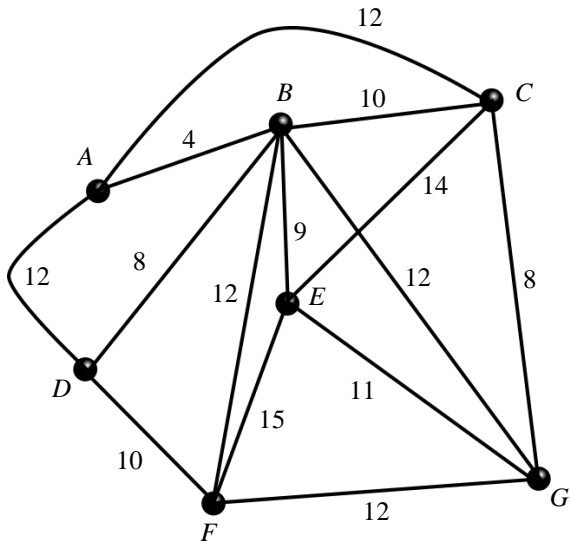
a) (3 points) Based on the information in the chart, draw a weighted graph below:



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

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

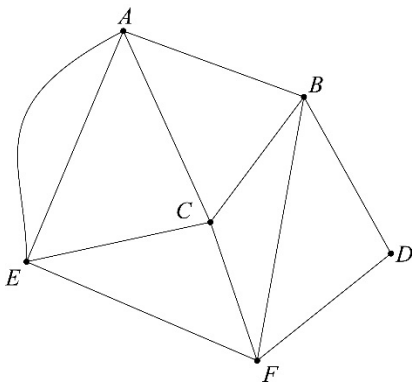
6) (6 points) For the weighted graph below, draw a minimal spanning tree. Also, declare what the minimal weight is:



7) (2 points each) Define the following terms. Examples will not be accepted for credit:  
 a) Bridge  
 b) Euler Circuit

8) (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) *BCAEFDB* \_\_\_\_\_
- b) *ABDFBCFECAE* \_\_\_\_\_
- c) *CBDFEA* \_\_\_\_\_
- d) *ABDFBCFECAEA* \_\_\_\_\_

**Be sure to show unit fractions as needed!**

9) (3 points each) Convert as directed.

a) 72 inches to feet

b) 48 cm to in.

10) (3 points) **Explain** how to use the sentence *King Henry Died Monday Drinking Chocolate Milk* to convert 0.038 km to cm.

11) (5 points) A peregrine falcon can reach a top speed of 259.1 kilometers per hour. What is this speed in feet per second? Round answer to two places.

12) (5 points) An American football field has dimensions of 120 yd. by 53.5 yd. If it costs \$1,200,400 a year to maintain the field, how much does it cost to maintain one square meter? Round to two decimal places.

**Be sure to show unit fractions as needed!**

13) (3 points) A bathtub is 6 ft by 3 ft by 3 ft. How many liters of water will it hold?

14) (3 points each) Considering a watermelon that weighs 200 pounds, what is its weight in...

a) Ounces

b) Grams

c) Kilograms

15) (3 points each) Convert as directed. Round to two places as needed:

a) 14°F to °C

b) 240 °C to °F

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

**TABLE 5.2.2** Area in the Metric System

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

**TABLE 5.2.3** English and Metric Approximations for Area1 square inch (in.<sup>2</sup>)  $\approx$  6.45 square centimeters (cm<sup>2</sup>)1 square foot (ft.<sup>2</sup>)  $\approx$  0.093 square meters (m<sup>2</sup>)1 square yard (yd.<sup>2</sup>)  $\approx$  0.84 square meters (m<sup>2</sup>)1 square mile (mi.<sup>2</sup>)  $\approx$  2.56 square kilometers (km<sup>2</sup>)1 acre  $\approx$  0.405 hectare (ha)**TABLE 5.2.5** Capacity and Volume in the English System

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

**TABLE 5.2.8** Volume and Capacity in the Metric System

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

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

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

**TABLE 5.2.4** Volume in the English System1 cubic foot (1 ft.<sup>3</sup>)  $\approx$  1728 cubic inches (1728 in.<sup>3</sup>)1 cubic yard (1 yd.<sup>3</sup>) = 27 cubic feet (27 ft.<sup>3</sup>)**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 Weight2.2 pounds  $\approx$  1 kilogram2200 pounds  $\approx$  1 metric tonne (t) = 1000 kilograms1 ounce  $\approx$  28.35 grams



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

<b>Volume in Cubic Units</b>	<b>Capacity</b>	<b>Weight</b>
1 cubic centimeter	= 1 milliliter (mL)	= 1 g
1 cubic decimeters = 1000 cm <sup>3</sup>	= 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**

$$C = K - 273.15$$