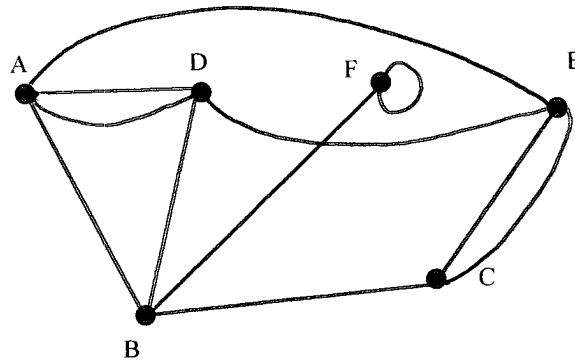
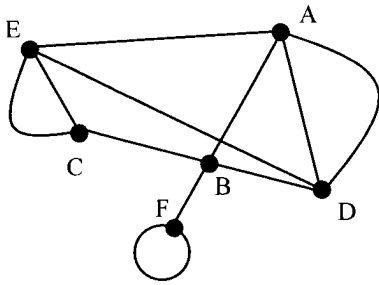
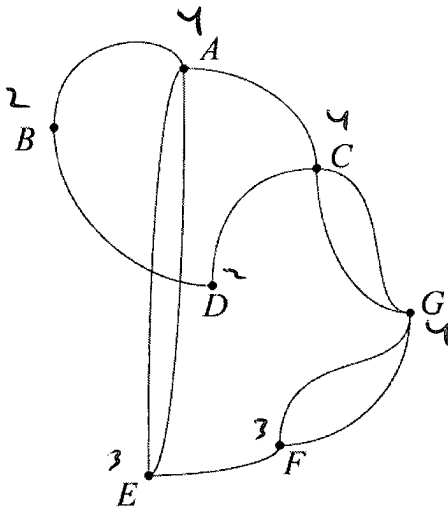


1) (4 points) Draw an equivalent graph to the given graph below by connecting the vertices:

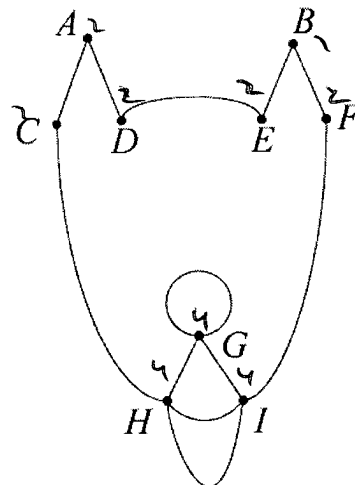


2) (8 points each) For the following graphs below, label each vertex with its degree. Also, determine if there is an Euler Circuit, Euler Path, or neither. **If there is an Euler Circuit or Euler Path, give an example of one.** If neither, explain why not:

a)



b)

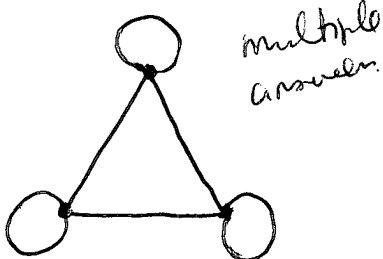


Euler PATH EA BDC A EFG C G F

Euler Circuit A D E B F I G G H I H C A

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:

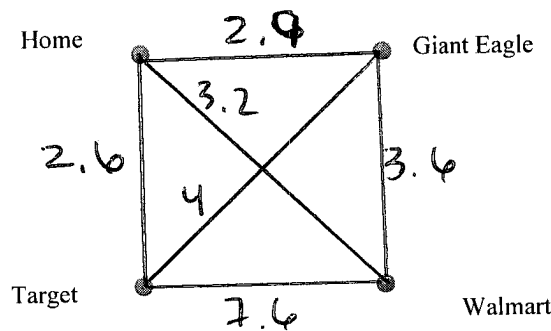
Impossible. Total degree must be even.

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

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, which Circuit should Mike choose?

- H G W T H $2.9 + 3.6 + 7.6 + 2.6 = 16.7$
- H G T W H $2.9 + 4 + 7.6 + 3.2 = 17.7$
- H T G W H $2.6 + 4 + 3.6 + 3.2 = 13.4 \leftarrow \text{Best}$

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

H T G W H
 $2.6 + 4 + 3.6 + 3.2 = 13.4$

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

a) Loop

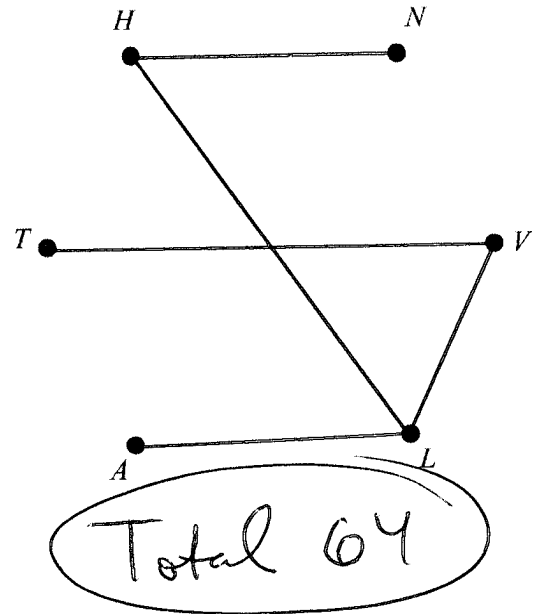
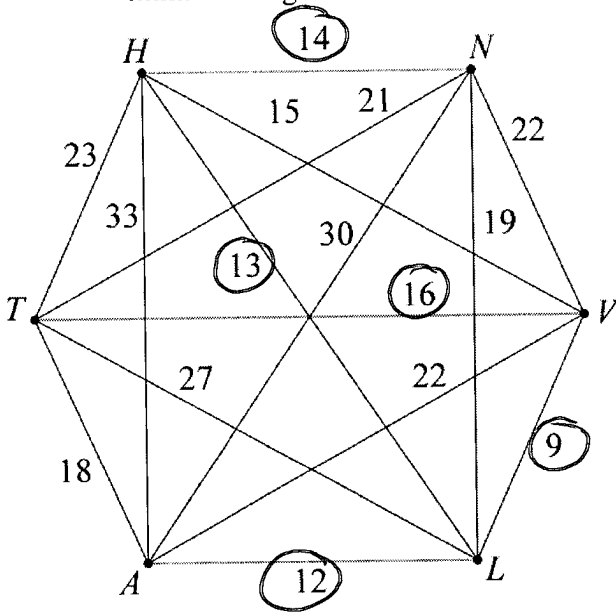
b) Bridge

Woooo!

cross it like you mean it!

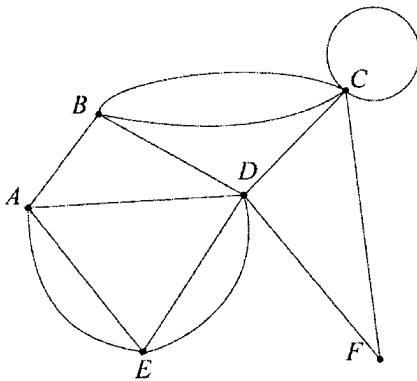
18

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*

Circuit
HAM Circuit
HAM PATH
PATH

8) (3 points each) Convert as directed:

a) 12 yards to feet:

$$12 \text{ yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} = 36 \text{ ft}$$

b) 110 inches to centimeters:

$$110 \text{ in} \cdot \frac{2.54 \text{ cm}}{1 \text{ in}} = 279.4 \text{ cm}$$

c) 12 feet to millimeters:

$$12 \text{ ft} \cdot \frac{30.48 \text{ cm}}{1 \text{ ft}} \cdot \frac{10 \text{ mm}}{1 \text{ cm}} = 3657.6 \text{ mm}$$

d) 3.1415 km to mm: K H D U D C M
6 places to the right

$$3,141,500 \text{ mm}$$

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?

mi → ft → cm → m
hr → min → sec

$$\frac{27.7 \text{ mi}}{1 \text{ hr}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi}} \cdot \frac{30.48 \text{ cm}}{1 \text{ ft}} \cdot \frac{1 \text{ m}}{100 \text{ cm}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} = 12.38 \text{ m/sec}$$

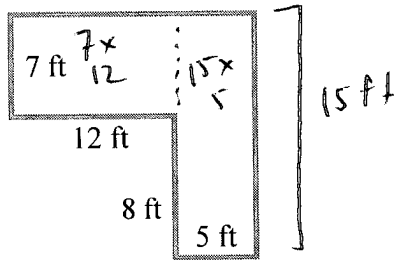
10) (6 points) One curtain panel measures 42 inches by 78 inches. If the seamstress will use fabric that costs \$20 per square yard, how many square yards does she need to make **two curtains** and how much will it cost for both? Do not round until the very end of the problem.

one panel: $42 \text{ in} \times 78 \text{ in} = 3276 \text{ in}^2$ two panels $2 \times 3276 \text{ in}^2 = 6552 \text{ in}^2$

$$6552 \text{ in}^2 \cdot \frac{1 \text{ ft}^2}{144 \text{ in}^2} \cdot \frac{1 \text{ yd}^2}{9 \text{ ft}^2} = \frac{91}{18} \text{ yd}^2$$

$$\frac{91}{18} \text{ yd}^2 \cdot \frac{\$20}{1 \text{ yd}^2} = \boxed{\$101.11}$$

- 11) (6 points) A swimming pools plan is shown below. Assuming that the pool is 5 feet deep, how many gallons of water are necessary to fill it? Recall the area of a rectangle is length x width. The volume of a box is length x width x height.



$$5(7 \times 12 + 15 \times 5) = 795 \text{ ft}^3$$

$$795 \text{ ft}^3 \cdot \frac{7.48 \text{ gal}}{1 \text{ ft}^3}$$

$$5946.6 \text{ gal}$$

- 12) (3 points each) The Guinness World Record for the world's heaviest pumpkin is 2,624 pounds. What is this weight in...

a) Ounces?

$$2624 \text{ lb} \cdot \frac{16 \text{ oz}}{1 \text{ lb}}$$

$$= 41,984 \text{ oz}$$

b) Kilograms?

$$2624 \text{ lb} \cdot \frac{1 \text{ kg}}{2.2 \text{ lb}}$$

$$\approx 1192.73 \text{ kg}$$

- 13) (3 points each) Convert as directed:

a) 64°F to $^\circ\text{C}$

$$C = \frac{5}{9}(64 - 32)$$

$$= 17.78^\circ\text{C}$$

b) -10°C to $^\circ\text{F}$

$$F = \frac{9}{5}(-10) + 32$$

$$= 14^\circ\text{F}$$