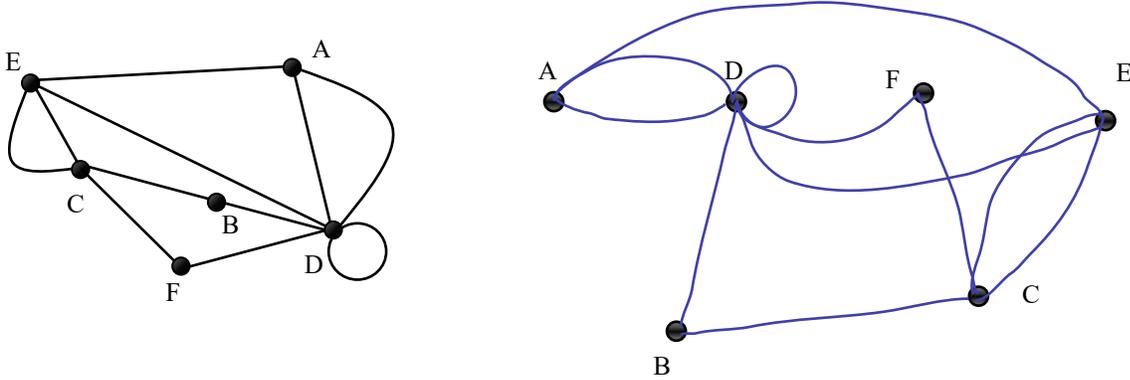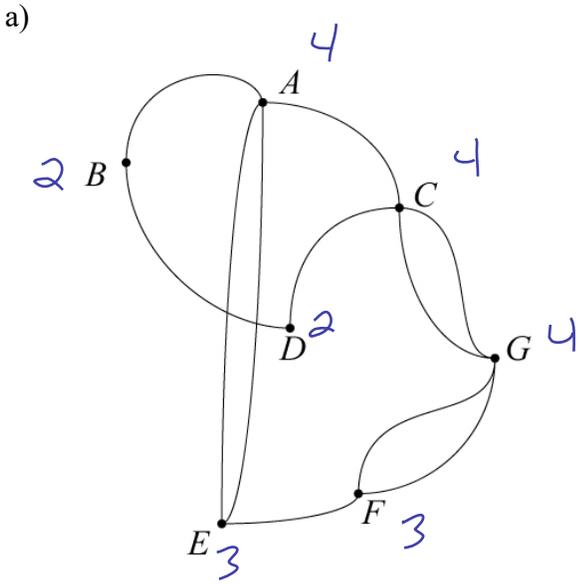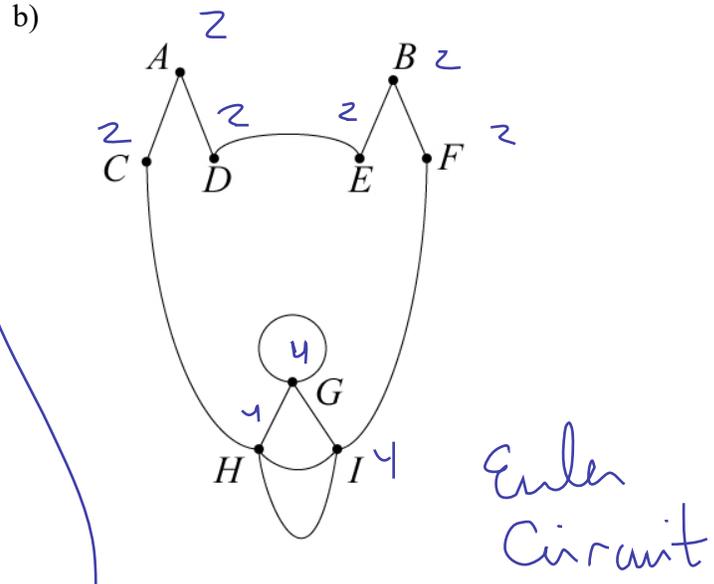1) (4 points) Draw an equivalent graph to the given graph below by connecting the vertices:

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:
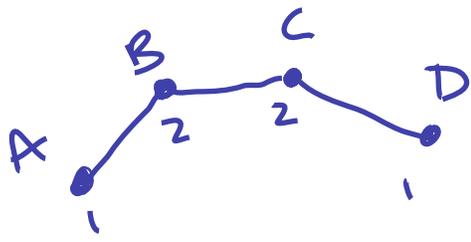
a)

Euler Path   EABDCAEFGCGF

b)

Euler Circuit

ADEBFIGGHIHCA

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

a) A graph where every edge is a bridge and the total degree is 6:

b) A graph where every edge is a bridge and would also contain an Euler Circuit:

im possible
Bridges don't allow
us to return where
we started

26

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	1.8	3.2
Giant Eagle	2.9		4.9	3.6
Target	1.8	4.9		7.6
Walmart	3.2	3.6	7.6	

a) (3 points) Based on the information in the chart, draw a weighted graph below:
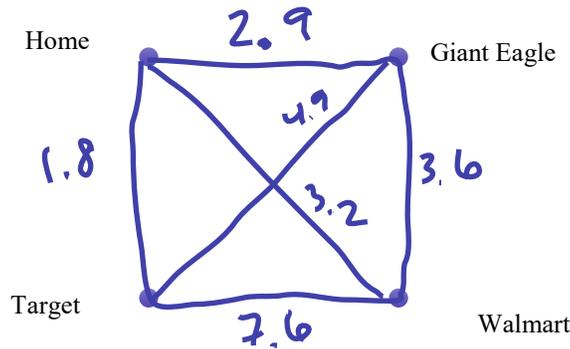
b) (7 points) List the three unique Hamilton Circuits for this graph and find the corresponding total weight. According to the Brute Force Method, which Circuit should Mike choose?
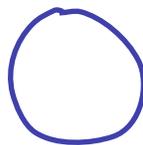
□ HGWTH   2.9+3.6+7.6+1.8= 15.9
☒ HGTWH   2.9+4.9+7.6+3.2= 18.6
☒ HTGWH   1.8+4.9+3.6+3.2= 13.5 ← Optimal!

c) (4 points) For the same graph in part a, solve the problem using the Nearest Neighbor Method:
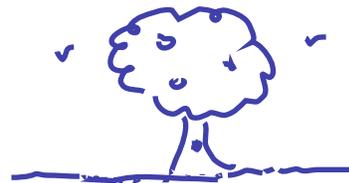
HTGWH 13.5   same answer!

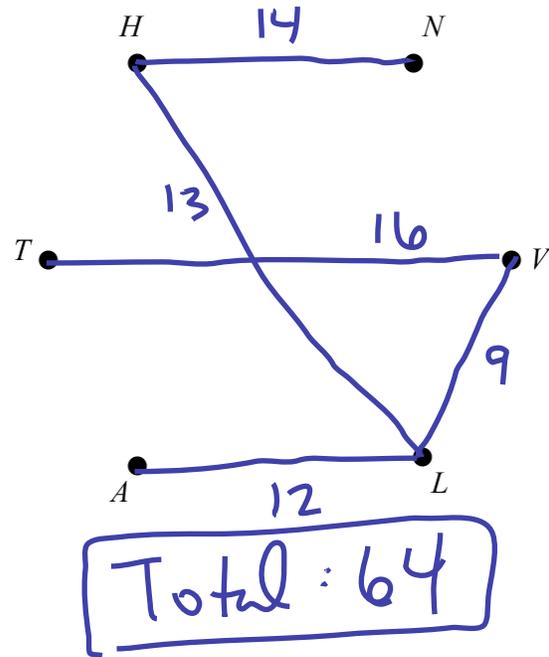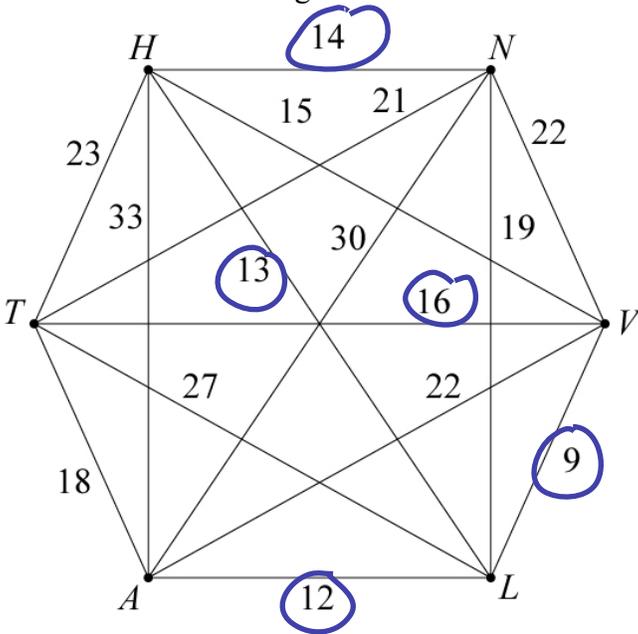5) (2 points each) Define the following terms. Examples will not be accepted for credit:
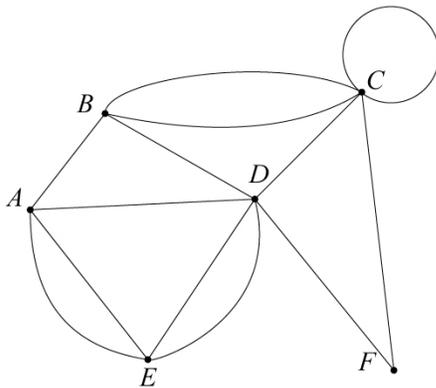a) Loop   b) Tree

18

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

Left graph (hexagonal weighted graph) with vertices H, N, T, V, A, L and weights:
14, 15, 21, 22, 23, 33, 30, 19, 13, 16, 27, 22, 9, 18, 12

Circled weights: 14, 13, 16, 9, 12

Right graph (minimal spanning tree):
H —14— N
T —13 (to L area)
T —16— V
A —12— L
L —9— V
Total : 64

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

Graph with vertices A, B, C, D, E, F (C has a loop)

a) *ABCCFDEA*   **Circuit**

b) *BCFDEAB*   **Ham. Circuit**

c) *FDEABC*   **Ham Path**

d) *FDEAB*   **Path**

14

8) (3 points each) Convert as directed:
   a) 18 yards to feet:

$$18 \text{ yd} \cdot \frac{3 \text{ ft.}}{1 \text{ yd.}} = \boxed{54 \text{ ft}}$$

   b) 67.5 centimeters to inches:

$$67.5 \text{ cm} \cdot \frac{1 \text{ in.}}{2.54 \text{ cm}} = 26.57 \text{ in}$$

   c) 10 feet to millimeters:

$$10 \text{ ft} \cdot \frac{30.48 \text{ cm}}{1 \text{ ft}} \cdot \frac{10 \text{ mm}}{1 \text{ cm}} = \boxed{3048 \text{ mm}}$$

   d) 14,988.5 mm to km:

K H D U D C M

014988.5

$$\boxed{0.0149885 \text{ km}}$$

9) (6 points) In 2017, the fastest car in the world, the Koenigsegg Agera RS, could travel at a speed of 447.19 kilometers per hour. How has is this speed in feet per second?

$$\frac{447.19 \text{ km}}{1 \text{ hr}} \cdot \frac{1 \text{ hr}}{60 \text{ min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{1 \text{ mi.}}{1.609 \text{ km}} \cdot \frac{5280 \text{ ft}}{1 \text{ mi.}}$$

$$\approx 407.63 \text{ ft/sec}$$

10) (6 points) One curtain panel measures 42 inches by 90 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.

$$42 \underset{\text{in}}{\times} 90 \underset{\text{in}}{\times} 2 = 7560 \text{ in}^2$$

$$7560 \text{ in}^2 \cdot \frac{1 \text{ yd}^2}{36^2 \text{ in}^2} \cdot \frac{\$20}{1 \text{ yd}^2} \approx \boxed{\$116.67}$$

24

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.

7 ft

10 ft

8 ft

5 ft
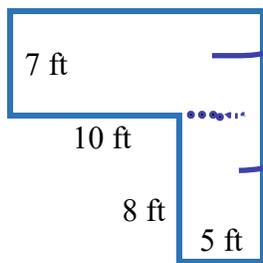
$7 \times (10+5) = 105 \, ft^2$

$8 \times 5 = 40 \, ft^2$

$(105 + 40 \, ft^2) \cdot 5 \, ft$

$= 725 \, ft^3$

$725 \, ft^3 \cdot \dfrac{7.48 \, gal}{1 \, ft^3}$

$= \boxed{5423 \, gal}$

12) (3 points each) The Guinness World Record for the world's heaviest rabbit is 55 pounds. What is this weight in…

a) Ounces?

b) Kilograms?

$55 \, lb \cdot \dfrac{16 \, oz}{1 \, lb}$

$= 880 \, oz$

$55 \, lb \cdot \dfrac{1 \, kg}{2.2 \, lb}$

$= \boxed{25 \, kg}$

13) (3 points each) Convert as directed:

a) 64°F to °C

b) −10°C to °F

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

$= \boxed{17.78°C}$

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

$= \boxed{14°F}$