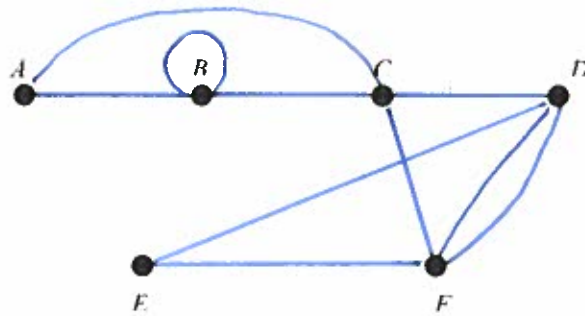
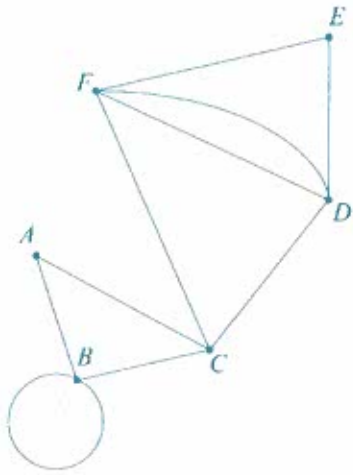
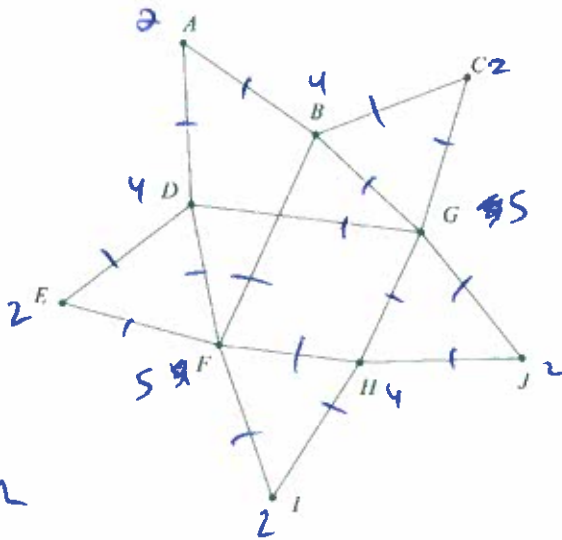


1) (4 points) Draw an equivalent graph to the given graph below by connecting the vertices:



2) (9 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)

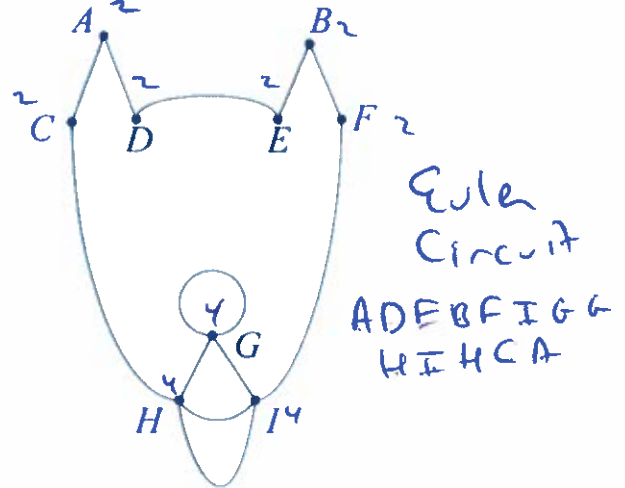


Euler Path

F E D A B C B J H I F D G B F H G

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b)



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 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:

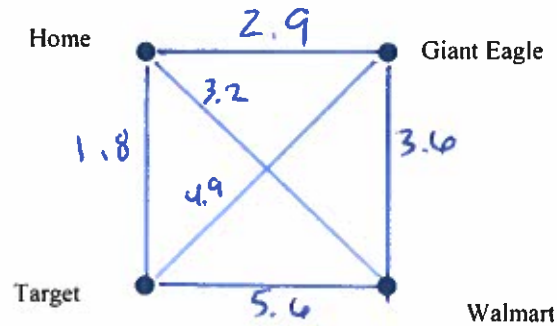
Impossible.
Bridges make
odd degree
vertices.

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4) Mike needs to do some shopping for board games because he does not have enough. 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		5.6
Walmart	3.2	3.6	5.6	

a) (2 points) Based on the information in the chart, draw a weighted graph below:



b) (6 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 $2.9 + 3.6 + 5.6 + 1.8 = 13.9$
- HGTWH $2.9 + 4.9 + 5.6 + 3.2 = 16.6$
- HTGWH $1.8 + 4.9 + 3.6 + 3.2 = 13.5$

c) (3 points) For the same graph in part a, solve the problem using the Nearest Neighbor Method:

$$HTGWH = 13.5$$

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

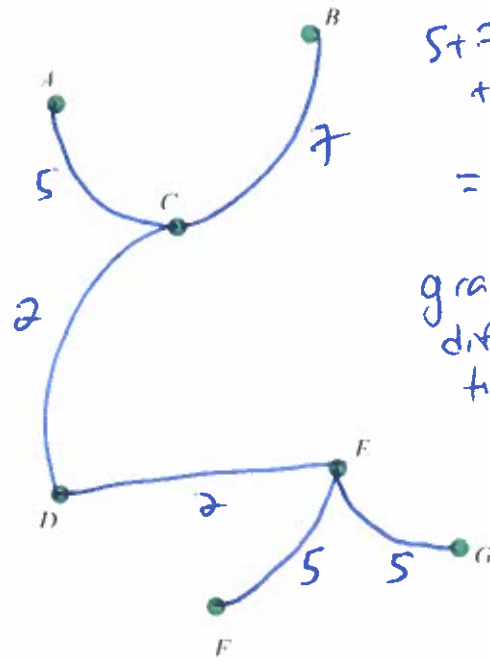
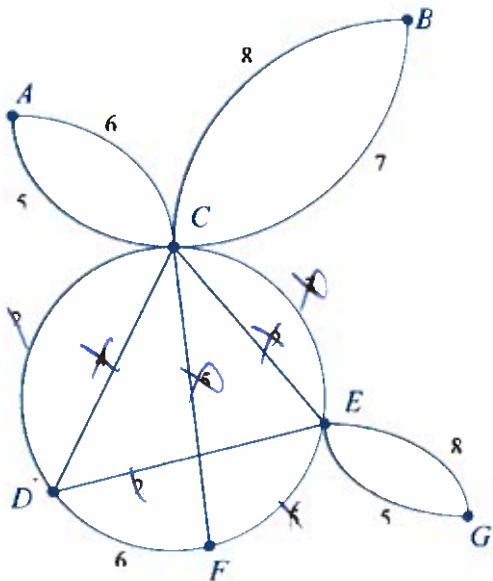
a) Bridge

b) Tree

definitions! ☺

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6) (5 points) For the weighted graph below, draw a minimal spanning tree. Also, declare what the minimal weight is:

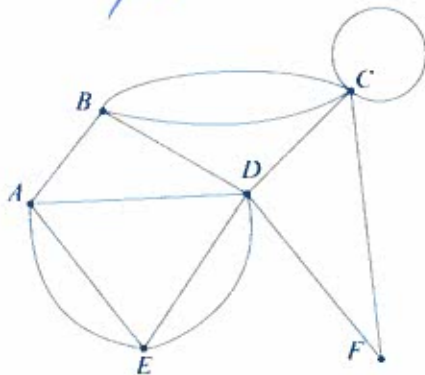


$$5 + 7 + 2 + 2 + 5 + 5 = 26$$

graph may differ but total weight is the same

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

e) CCBCDBADEAEDFC

Circuit

Ham. Circuit

Ham Path

Path

Euler Circuit

15

Be sure to show every unit fraction used. Otherwise, no credit will be awarded.

8) (3 points each) Convert as directed:

a) 27 yards to feet:

$$27 \text{ yd} \cdot \frac{3 \text{ ft}}{1 \text{ yd}} = 81 \text{ ft}$$

b) 67.5 centimeters to inches:

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

c) 10 feet to millimeters:

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

d) 10,020.6 mm to km:

mm
K H D U D C M
a

$$10,020.6 \text{ mm} \cdot \frac{1 \text{ km}}{1,000,000 \text{ mm}} = 0.0100206 \text{ km}$$

9) (6 points) In 2023, the fastest car in the world, the Koenigsegg Jesko Absolut, could travel at a speed of 330 miles per hour. How fast is this speed in meters per second?

mi → m *hr → sec*
mi → km → m

$$\frac{330 \text{ mi}}{\text{hr}} \cdot \frac{1.609 \text{ km}}{1 \text{ mi}} \cdot \frac{1000 \text{ m}}{1 \text{ km}} \cdot \frac{1 \text{ hr}}{3600 \text{ sec}} = 147.49 \text{ m/sec}$$

10) (6 points) One curtain panel measures 42 inches by 80 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.

$$42 \text{ in} \cdot 80 \text{ in} \cdot 2 = 6720 \text{ sq. in.}$$

$$6720 \text{ in}^2 \cdot \frac{1 \text{ yd}^2}{1296 \text{ in}^2} = 5.19 \text{ yd}^2$$

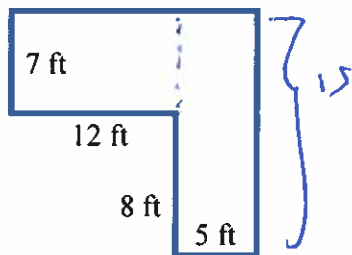
$$6720 \text{ sq in} \cdot \frac{1 \text{ sq yd}}{1296 \text{ sq in}} \cdot \frac{\$20}{1 \text{ sq yd}} = \$8103.70$$

1 yd = 36 in
1 yd² = 36² in² = 1296 in²

24

Be sure to show every unit fraction used. Otherwise, no credit will be awarded.

- 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.



$$7 \frac{\text{ft}}{\text{ft}} \cdot 12 \frac{\text{ft}}{\text{ft}} + 15 \frac{\text{ft}}{\text{ft}} \cdot 5 \frac{\text{ft}}{\text{ft}} = 159 \text{ ft}^2$$

$$159 \text{ ft}^2 \cdot 5 \text{ ft} = 795 \text{ ft}^3$$

$$795 \text{ ft}^3 \cdot \frac{7.48 \text{ gal}}{1 \text{ ft}^3} \approx 5946.6 \text{ gal}$$

- 12) (3 points each) According to the Guinness Book of World Records, Hercules the Liger is the largest and heaviest cat in the world, weighing in at a staggering 922 pounds. What is this weight in...

a) Ounces?

$$922 \text{ lb} \cdot \frac{16 \text{ oz}}{1 \text{ lb}}$$
$$= \del{14752}$$
$$= 14,752 \text{ oz}$$

b) Kilograms?

$$922 \text{ lb} \cdot \frac{1 \text{ kg}}{2.2 \text{ lb}} \approx 419.09 \text{ kg}$$

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

a) 75°F to $^\circ\text{C}$

$$C = \frac{5}{9}(75 - 32)$$

$$C \approx 23.89^\circ\text{C}$$

b) -15°C to $^\circ\text{F}$

$$F = \frac{9}{5}(-15) + 32$$

$$F = 5^\circ\text{F}$$

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