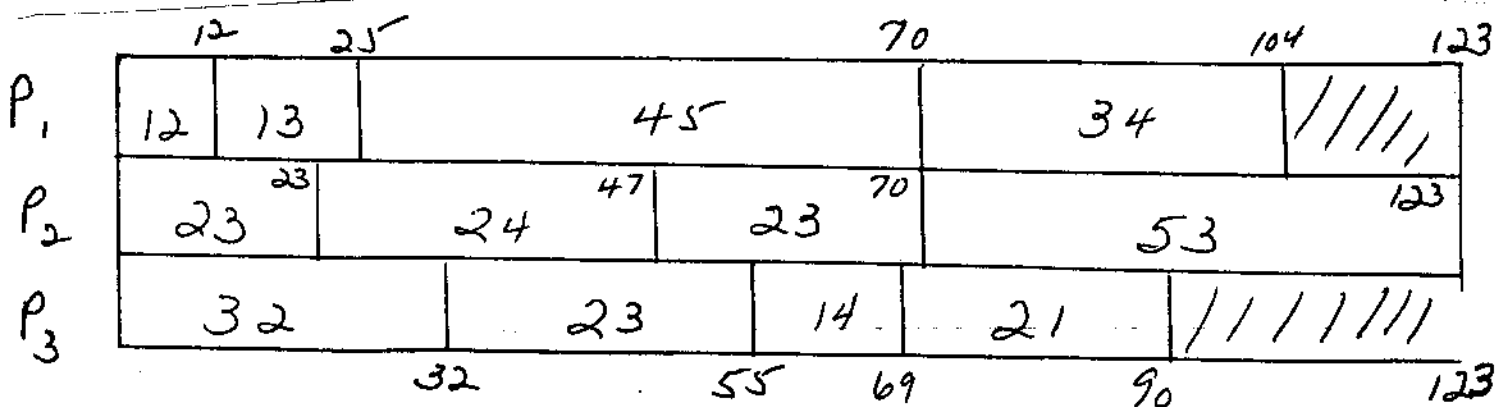


1. Determine the valence of each vertex. Graph I has all valences even – it has an Euler circuit. Graph II has some valences odd-it does not have an Euler circuit.
2.
  - I. True.
  - II. False. An Euler circuit must cover each edge exactly once.
  - III. False. The minimum completion time for an order requirement digraph is the length of the longest path.
3.
  - I. True.
  - II. False. Eulerization is the process of duplicating existing edges on (adding new edges to) a graph so as to make a graph that possesses an Euler circuit.
  - III. True.
4. BCEDAB
- 5.



The completion time is 123 minutes.

6. Enter x-values in  $L_1$  and y-values in  $L_2$ .  
 Choose Lin Reg ( $ax + b$ )  $L_1, L_2$  from the CALC menu.  
 $a = .8435633126$   
 $b = -32.96490278$   
 This equation is  $y = .84x - 32.96$ , correct to two decimal places.
7. The correlation coefficient is so small that the regression equation will not be a very good predictor of Y.

8. There are 29 pieces of data. The position of the median is  $\frac{n+1}{2} = \frac{29+1}{2} = 15$ .

The median is 48. The position of  $Q_1$  and of  $Q_3$  is  $\frac{14+1}{2} = 7.5$ .

$$Q_1 = \frac{30+34}{2} = 32 \quad Q_3 = \frac{53+59}{2} = 56$$

The low value is 16; the high value is 69.

9. Find the class mark for each class of data: 49.5, 149.5, 249.5, 349.5, 449.5, 549.5, 649.5.

Enter the class marks in  $L_1$  and the number of students in  $L_2$ .

Choose 1 – Var Stats  $L_1, L_2$  from the CALC menu.

$$\bar{x} = 379.5$$

$$s = 200.8$$

10. I. False. The sample size is 450.  
 II. True.  
 III. True.  $\frac{270}{450} = 60\%$

11. Outcome	Win \$1	Win \$2	Lose \$1
	+ 1	+ 2	- 1
Probability	0.25	0.10	0.65

$$\mu = s_1 p_1 + s_2 p_2 + s_3 p_3$$

$$\mu = 1(0.25) + 2(0.10) + (-1)(0.65)$$

$$\mu = -0.2$$

$$\sigma^2 = (s_1 - \mu)^2 p_1 + (s_2 - \mu)^2 p_2 + (s_3 - \mu)^2 p_3$$

$$\sigma^2 = (1 - (-0.2))^2 (0.25) + (2 - (-0.2))^2 (0.10) + (-1 - (-0.2))^2 (0.65)$$

$$\sigma^2 = 1.26$$

$$\sigma = \sqrt{1.26} = 1.12$$

12.  $n = 150$

$$\mu_{\bar{x}} = 26.35$$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{7.2}{\sqrt{150}}$$

95% of all data fall within 2 standard deviations of the mean.

$$\mu_{\bar{x}} \pm 2\sigma_{\bar{x}} = 26.35 \pm 2 \cdot \frac{7.2}{\sqrt{150}} = 26.35 \pm 1.18$$

Range of hours is 25.17 hr to 27.53 hr.

13. I. False.  
II. True.  
III. True.

14. Round 1. D is eliminated.  
Round 2. B is eliminated.  
Round 3. A wins by majority.

15. 75% of 45 =  $.75(45) = 33.75$   
75% approval requires that a nominee gain at least 34 votes.

Nominee	A	B	C	D	E	F	G	H
Number of Votes	34	21	19	23	36	18	34	30

Nominees A, E and G all received at least 34 votes and are, therefore, elected.

16.  $\mu = 88,000$   
 $\sigma = 12,500$

Approximately 95% of all data fall within 2 standard deviations of the mean.

$\mu \pm 2\sigma = 88,000 \pm 2(12,500) = 88,000 \pm 25,000$ . The interval ranges from 63,000 cans to 113,000 cans.

17. I. True

II. False. Since  $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ , the standard deviation of a distribution of sample means from a given population increases only if sample size decreases.

III. True.

18. A total of  $57 + 95 = 152$  VCRs were purchased, given that brand M was purchased.

Therefore, the percent of purchasers who bought a 2-head VCR =  $\hat{p} = \frac{57}{152} = 37.5\%$ .

$$s_{\hat{p}} = \sqrt{\frac{\hat{p}(100 - \hat{p})}{n}} = \sqrt{\frac{37.5(100 - 37.5)}{152}} = 3.9\%$$

Name: \_\_\_\_\_

Section: \_\_\_\_\_

Instructor: \_\_\_\_\_

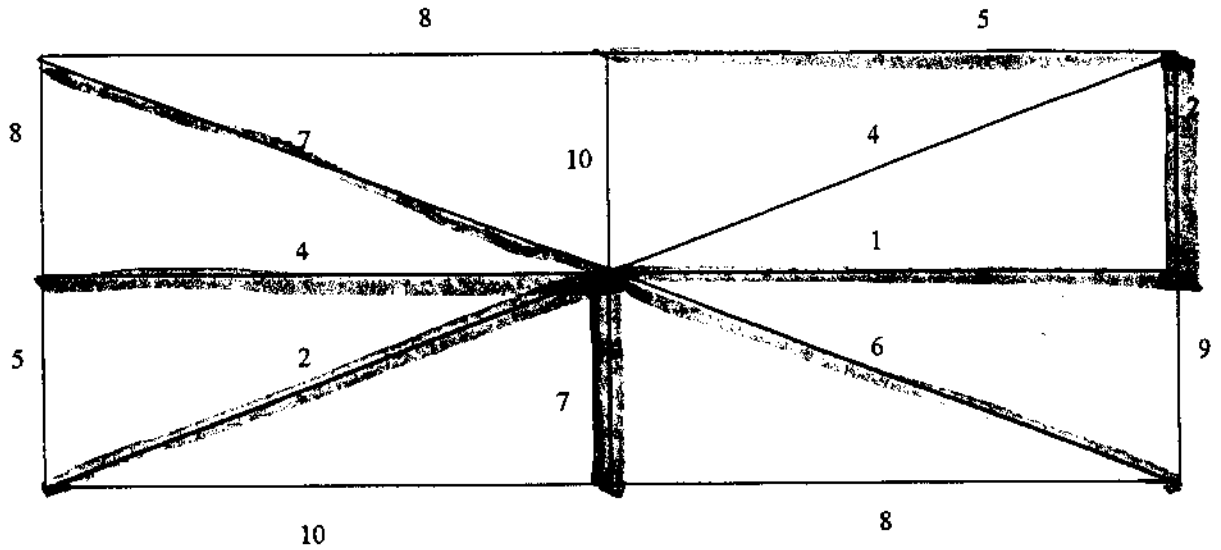
The following questions are free response. Please show all work in order to receive credit.

19. Complete each of the following definitions with the correct term. (18 pts)

- a. The number of edges meeting at a vertex is known as the valence of that vertex.
- b. The longest path in an order-requirement-digraph is called the Critical path.
- c. A priority list is an ordering of the collection of tasks to be scheduled.
- d. Two variables are Confounded when their effects on the outcome of a study cannot be distinguished from one another.
- e. An outlier is a data point that falls clearly outside the overall pattern of a set of data.
- f. A number computed from a sample is called a statistic.
- g. A Control Chart monitors a production process over time.
- h. A preference list is a ballot that provides a rank ordering of candidates, from best to worst, in the eyes of the voter.

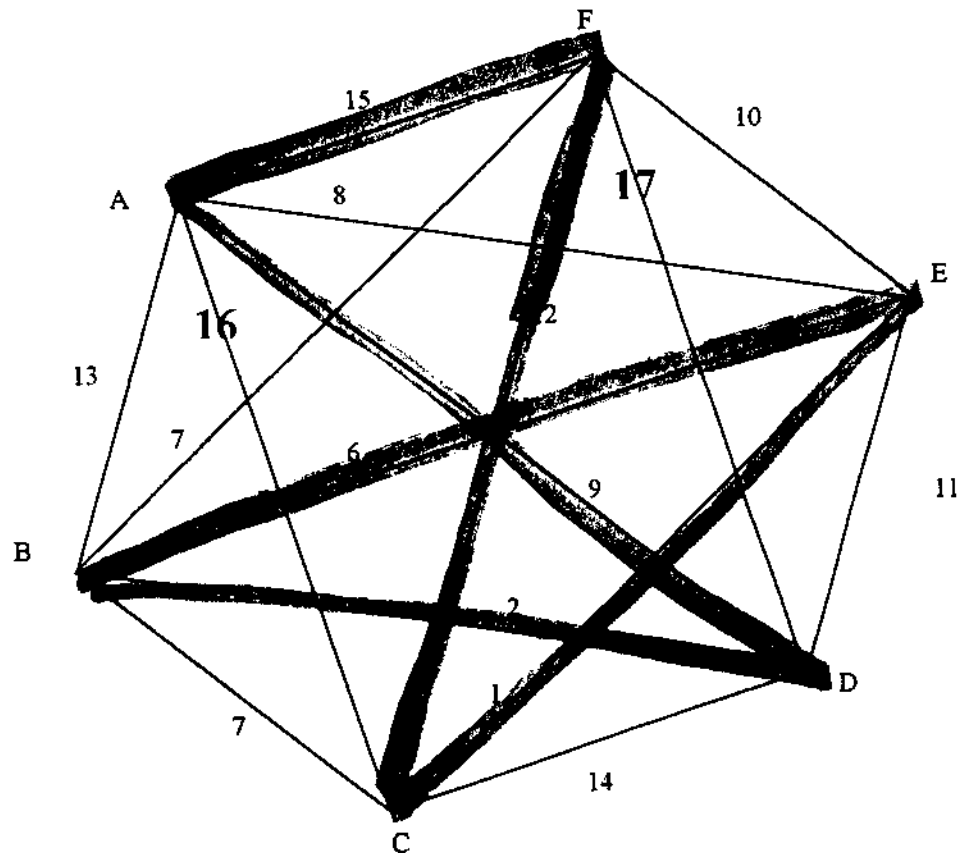
20. Use Kruskal's Algorithm to find a minimum-cost spanning tree for the following. Show the spanning tree on the graph below? (6 pts)

What is the cost of the spanning tree? 34

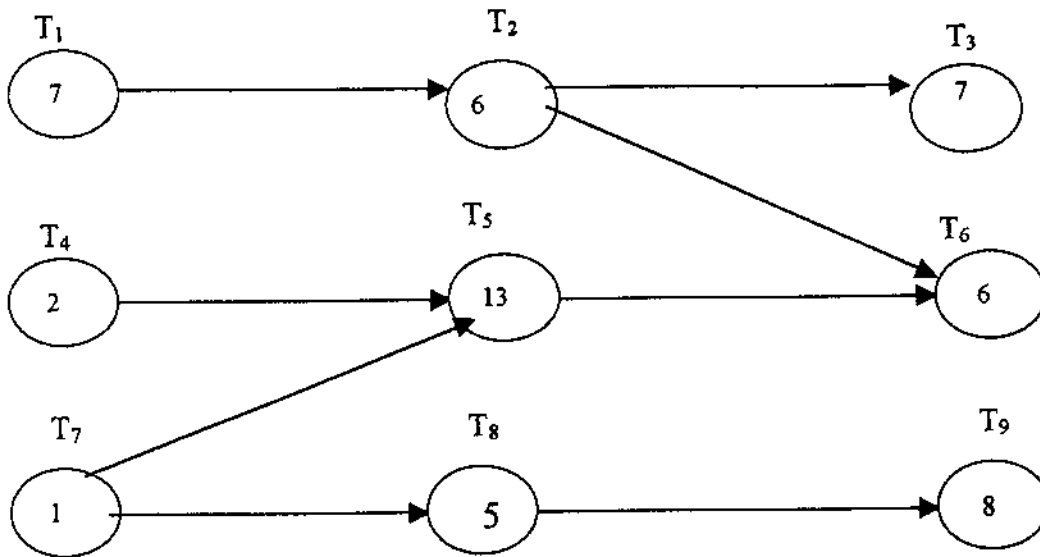


21. Use the Sorted Edges algorithm to find a Hamiltonian circuit for the graph below. (6 pts)

Write the circuit A D B E C F A



22. Given the priority list,  $T_5 T_9 T_1 T_3 T_2 T_6 T_8 T_4 T_7$ , and the order-requirement digraph shown below, schedule the tasks using the list processing algorithm, with three processors. (10 pts)



		7		13		20	
M <sub>1</sub>		T <sub>1</sub>		T <sub>2</sub>		T <sub>3</sub>	///
M <sub>2</sub>	T <sub>4</sub> 2		T <sub>5</sub>		15	T <sub>6</sub>	21
M <sub>3</sub>	T <sub>7</sub>	T <sub>8</sub>		T <sub>9</sub>		///	///
	1	6		14			

Finished:  $T_7, T_4, T_8, T_1, T_2, T_9, T_5, T_3, T_6$

23. The NAEP test was given to a random sample of 100 women, aged 21 to 25. The mean quantitative score was 275. It is known that the standard deviation of all individual scores is  $\sigma = 75$ . (10 pts)

- a. Find the standard deviation of the sampling distribution of this statistic.

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{75}{\sqrt{100}} = 7.5$$

- b. Construct a 95% confidence interval for the mean score  $\mu$  of the population of all young women aged 21 to 25.

$$275 \pm 2(7.5) \Rightarrow 275 \pm 15 \\ \Rightarrow 260 \text{ to } 290$$

- c. Suppose that a sample of 400 women also produced the sample mean  $\bar{x} = 275$  with standard deviation  $\sigma = 75$ . Construct a 95% confidence interval for  $\mu$ .

$$\sigma_{\bar{X}} = \frac{\sigma}{\sqrt{n}} = \frac{75}{\sqrt{400}} = 3.75 \\ 275 \pm 2(3.75) \Rightarrow 275 \pm 7.5 \\ \Rightarrow 267.5 \text{ to } 282.5$$

- d. What are the margins of error for samples of size 100 and 400?

<u>Sample Size</u>	<u>Margin of Error</u>
$n = 100$	15
$n = 400$	7.5

- e. How does increasing sample size affect the margin of error of a confidence interval?

Increasing sample size decreases the margin of error.

24. One hundred voters are to elect one of the four candidates A, B, C, or D. Their preference lists are shown below. (10 pts)

	Number of Votes			
	40	32	17	11
First choice	A	B	D	C
Second choice	C	C	C	D
Third choice	B	A	B	A
Fourth choice	D	D	A	B

Which candidate wins using:

a. plurality?  $A = 40$        $B = 32$        $C = 11$        $D = 17$

*A wins*

b. the Borda count?

$$A: 40 \cdot 3 + 43 \cdot 1 + 17 \cdot 0 = 163$$

$$B: 32 \cdot 3 + 57 \cdot 1 + 11 \cdot 0 = 153$$

$$C: 11 \cdot 3 + 89 \cdot 2 = 211$$

$$D: 17 \cdot 3 + 11 \cdot 2 + 72 \cdot 0 = 73$$

*C wins*

c. sequential pairwise voting with the agenda D, B, C, A?

<i>D vs B</i>	<i>B vs C</i>	<i>C vs A</i>
28    72	32    68	60    40
<i>B wins</i>	<i>C wins</i>	<i>C wins</i>

*C is the winner*

d. the Hare system?

Round 1: *C is eliminated*  
 Round 2: *D is eliminated*  
 Round 3: *A has a majority*  
*A wins*