

Sample Exam 3

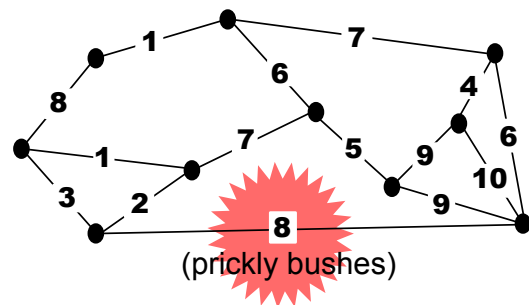
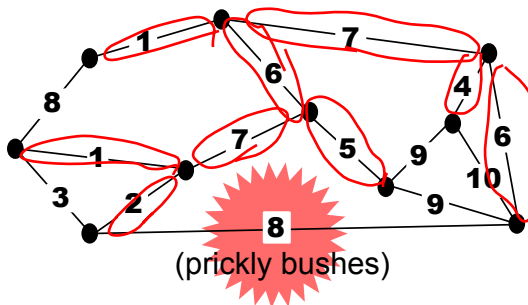
MATH 130

Use a #2 pencil. Calculators are allowed, but cell phones, i-pods, etc. are NOT acceptable. Please turn cell phones off.

Choose the alternative that best completes the statement or answers the question and mark your answer on the scantron form. Scantrons with no answers marked will receive a score of 0.

Use the following for questions 1 and 2.

Alice has to help decorate a very merry unbirthday celebration for the Mad Hatter. The Mad Hatter wants 10 locations connected by colored paper chains. The following graph shows the locations as vertices and gives the length (in rods) between locations. Alice, being a very well educated girl, decides to use Kruskal's Algorithm to find the shortest length of paper chain to decorate the very merry unbirthday celebration, although she is a bit nervous about the prickly bushes! (Two copies of the graph have been provided.)

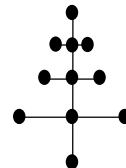


1. Using Kruskal's Algorithm, what is the total length (in rods) of paper chain that Alice strings up?
 - A) 33
 - ☒ B) 39
 - C) 35
 - D) 40
 - E) None of the above
2. Using Kruskal's Algorithm, does Alice avoid the prickly bushes?
 - A) No, the minimum weight spanning tree requires that Alice use the edge passing through the bushes.
 - ☒ B) Yes, the minimum weight spanning tree does NOT require Alice to use the edge passing through the bushes.
 - C) There is not enough information to answer this question.
 - D) Not only is Alice unable to avoid the prickly bushes; Kruskal's algorithm requires her to cross that edge twice!
 - E) None of the above
3. If a minimum spanning tree has 71 edges, how many vertices are in the tree?
 - ☒ A) 72
 - B) 71
 - C) 70
 - D) 71!
 - E) None of the above

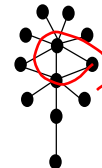
If the tree has N vertices,
The MST has $N-1$.

4. Which of the following statements is true?

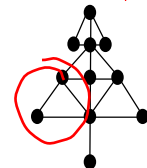
- A) Elm is a tree because there are circuits.
- ☒ B) Oak is not a tree because it has circuits.
- C) Cherry is not a tree because every edge is a bridge.
- D) Pine is not a tree because there are too many bridges.
- E) None of the above



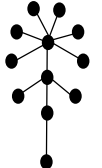
Pine Graph



Elm Graph



Oak Graph



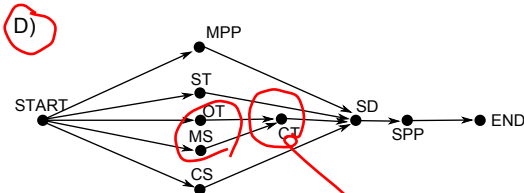
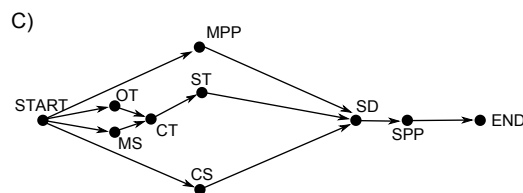
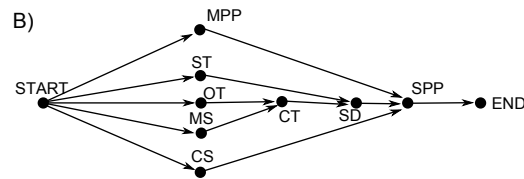
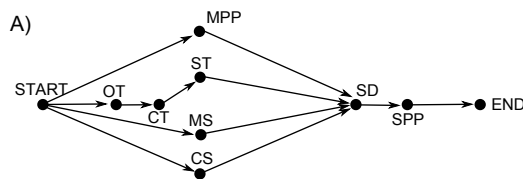
Cherry Graph

Circuits

Maya and Forrest own a catering company and must do the following tasks in order to prepare for Thanksgiving Dinner. Use the following list of tasks and precedence relations to answer questions 5 to 7.

Task	Symbol(Time)	Precedent Task(s)
Obtain Turkey	OT (.5)	
Make Stuffing	MS (1.5)	
Make Cranberry Sauce	CS(1.25)	
Make Pumpkin Pie	MPP (2)	
Cook Turkey	CT (3)	OT, MS
Set Table	ST (.75)	
Serve Dinner	SD(1)	MPP, ST, CT, CS
Serve Pumpkin Pie	SPP(.25)	SD

5. Which digraph best represents the tasks and their precedence relations?



E) None of the above

6. How many tasks must be completed before the task Cook Turkey?

- A) 3
- ☒ B) 2
- C) 4
- D) No tasks
- E) None of the above

7. Which of the following statements is true, according to the given precedence relations?

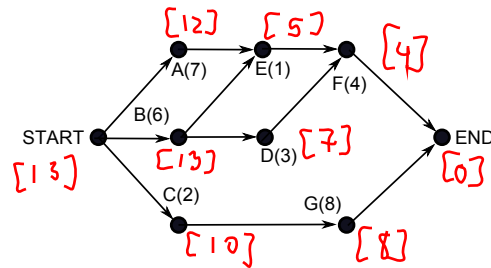
- ☒ A) Forrest could make the cranberry sauce at the same time Maya is setting the table. *CS*
- B) Forrest could serve the dinner while Maya is making cranberry sauce. *CS → SD*
- C) Maya could be making the pumpkin pie while Forrest is serving dinner. *MPP → SD*
- D) Maya could cook the turkey at the same time Forrest is making the stuffing.
- E) None of the above

MS → CT

Use the digraph to answer questions 8 to 9.

8. Using the backflow algorithm, what is the critical time of vertex B?

- ☒ A) 13
- ☐ B) 11
- ☐ C) 6
- ☐ D) 18
- ☐ E) None of the above



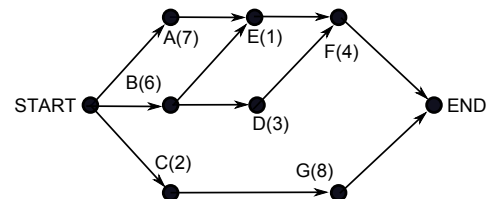
9. What is the priority list generated by the Decreasing Time Algorithm?

- ☒ A) ~~G, E, D, C, B, A~~
- ☒ B) ~~A, C, B, G, D, E, F~~
- ☒ C) ~~B, A, C, G, D, E, F~~
- ☒ D) G, A, B, F, D, C, E
- ☐ E) None of the above

Questions 10 to 12 refer to the following: Schedule this project represented by the digraph below on two processors using the priority list ~~G, A, B, F, D, C, E~~.

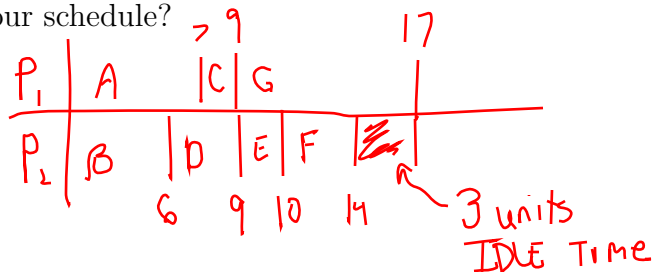
10. What are the first two tasks to be scheduled?

- ☐ A) G and A
- ☐ B) A, B and C
- ☐ C) A and C
- ☒ D) A and B
- ☐ E) G only



11. How much total idle time is in your schedule?

- ☐ A) 0
- ☐ B) 1
- ☒ C) 3
- ☐ D) 5
- ☐ E) None of the above



12. What is the completion time for the entire project?

- ☐ A) 13
- ☐ B) 15
- ☐ C) 16
- ☒ D) 17
- ☐ E) None of the above

13. If the number of tasks increases from 6 to 7 (an increase of 1 task), what is the increase in number of priority lists?

- ☐ A) One additional task adds 720 additional priority lists.
- ☒ B) One additional task adds 4320 additional priority lists.
- ☐ C) One additional task adds one additional priority list.
- ☐ D) Cannot be determined with the given information
- ☐ E) None of the above

$$n = 6, \text{ tasks} = 6! = 720$$

$$n = 7, \text{ tasks} = 7! = 5040$$

$$\begin{array}{r} 5040 \\ - 720 \\ \hline 4320 \end{array}$$

14. On every Monkey-Food-Monday the Pets Eat Us store has a 16% off sale. How much would Nicole have to pay for a bag of Monkey Food regularly priced at \$42.92 on one of these days?

☒ A) \$36.05
☐ B) \$6.87
☐ C) \$49.79
☐ D) \$35.63
☐ E) None of the above

$$42.92(1 - .16) = 36.0528$$

15. Ryan needs to buy a 30 pound dumbell. He goes to the store and finds that the LiftMax 30 pound dumbell is sold out and only the Chuck Norris special edition is available. The original dumbell price is \$24.56 and the special edition price is \$44.21. What is the percentage mark up for the special edition?

☒ A) 80%
☐ B) 43%
☐ C) 56%
☐ D) 20%
☐ E) None of the above

$$24.56(1 + x) = 44.21$$

$$1 + x = \frac{44.21}{24.56} = 1.80008$$

$$x = 1.8 - 1 = .8 \quad \text{so } 80\%$$

Use the following information for questions 16 to 17. There are 11 students in Dr. Kustas' class. The following are their exam scores:

{22, 45, 53, 58, 62, 73, 75, 86, 87, 93, 100}

mean:

16. What are the mean and median exam scores?

☐ A) Mean: 67.5 and Median: 67.5
☐ B) Mean: 69.5 and Median: 74
☐ C) Mean: 70 and Median: 75
☒ D) Mean: 68.5 and Median: 73
☐ E) None of the above

$$\frac{22 + 45 + 53 + 58 + 62 + 73 + 75 + 86 + 87 + 93 + 100}{11} = 68.545 \dots$$

17. Andy Kustard joins the class late and scores a 67 on that exam. What is the new median score?

☐ A) 68.4
☒ B) 70
☐ C) 71.5
☐ D) 69
☐ E) None of the above

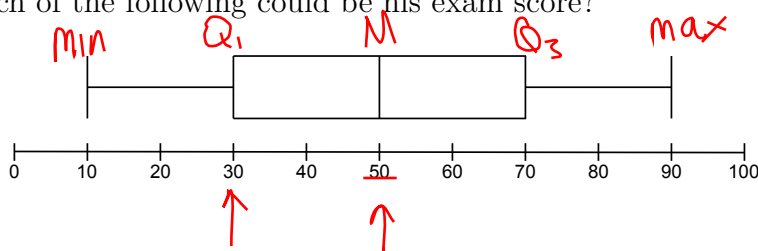
{22, 45, 53, 58, 62, 67, 73, 75, 86, 87, 93, 100}

average middle 2 values

$$(67 + 73) / 2 = 70$$

18. The box plot to the right summarizes 100 exam scores. If a student scored below the median but above Q_1 , which of the following could be his exam score?

☐ A) 20
☒ B) 40
☐ C) 60
☐ D) 80
☐ E) None of the above.



19. Compute Q_3 for the following data set: {3, 4, 5, 7, 9, 9, 10, 11, 11, 12, 13, 13, 14, 15, 17, 19, 20}

A) 13
 B) 14
 C) 17
 D) 12
 E) 11

$$n = 17$$

$$75\% (17) = 12.75$$

round up to get locator $\rightarrow 13$

Q_3

20. Find the standard deviation of {5, 7, 13, 23}

A) $\sqrt{74}$
 B) 3.5
 C) $\sqrt{7}$
 D) 7
 E) None of the above

$$\text{Step 1: mean} = (5 + 7 + 13 + 23) / 4 = 12$$

$$\text{Step 3: } 196 / 4 = 49$$

$$\text{Step 4: } \sqrt{49} = 7$$

$$\begin{aligned} \text{Step 2: } & (5-12)^2 \\ & (7-12)^2 \\ & (13-12)^2 \\ & + (23-12)^2 \\ & \hline & 196 \end{aligned}$$

21. If the standard deviation is small we can conclude that:

A) The data points are bunched together.
 B) Not much data was used.
 C) The average was low.
 D) The data points are spread far apart.
 E) None of the above

22. The following frequency table summarizes Quiz 8 scores for a Music Appreciation class. Find the Mean and Median quiz scores, rounding to two decimal places if necessary.

A) Mean: 7 and Median: 7
 B) Mean: 7.77 and Median: 8
 C) Mean: 8.34 and Median: 10
 D) Mean: 9 and Median: 8
 E) None of the above

# students	5	6	9	11	8
score	2	7	8	9	10

$$\text{mean: } (5 \cdot 2 + 6 \cdot 7 + 9 \cdot 8 + 11 \cdot 9 + 8 \cdot 10) / 39 = 7.769$$

39 students
 total
 middle is
 20th
 student

23. The pie chart to the right shows the percentage distribution of expenditure incurred in publishing a book. What is the expense for binding if the publisher pays \$45,900 for royalties?

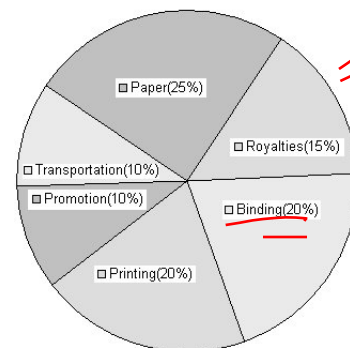
A) \$45,900
 B) \$30,600
 C) \$61,200
 D) \$15,300
 E) None of the above.

$$.15 (\text{total}) = 45,900$$

$$\text{total} = \frac{45,900}{.15}$$

$$= 306,000$$

$$20\% (306,000) = \$61,200$$



$$= \$45,900$$

24. Megan received a raw score of 60 out of a possible 80 points on her history exam. Her test score was in the 81st percentile. Which of the following statements are true?

Statement 1: Megan scored 60 percent on the exam.

Statement 2: Megan scored 73 percent on the exam.

~~★~~ Statement 3: Megan scored 75 percent on the exam.

Statement 4: Megan has an exam score higher than or equal to 60% of the class.

Statement 5: Megan has an exam score higher than or equal to 75% of the class.

~~★~~ Statement 6: Megan has an exam score higher than or equal to 81% of the class.

- (A) Statements 3 and 6
B) Statements 2 and 4
C) Statements 1 and 6
D) Statements 2 and 5
E) None of the above.

$$\frac{60}{80} = 75\%$$

$$81^{st} \%ile$$