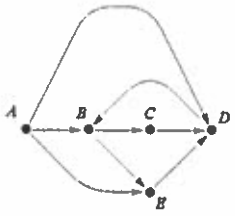
Chapter 8 – Test Review

Name: Key
Date: _____

1. Consider the digraph shown below; give the arc set A.

Answer: AB, AD, AE, BC, BE, CD, DB, ED



2. Consider the digraph from problem 1; what is the *indegree* of vertex E?

Answer: 2

3. Consider the digraph from problem 1; which vertices, if any, are *incident to* C?

Answer: B

4. Consider the digraph from problem 1; which arcs, if any, are *adjacent to* AB?

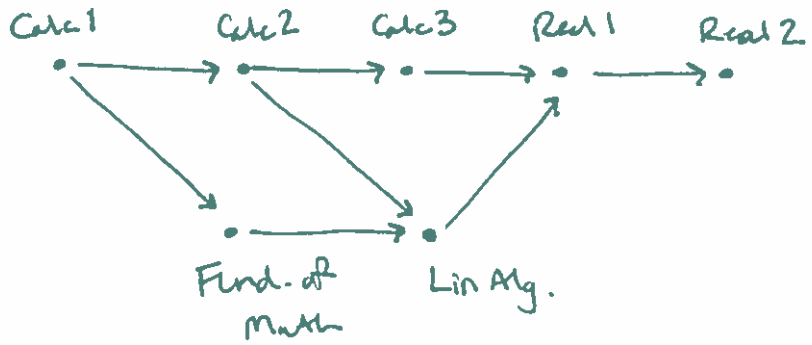
Answer: BC and BE

5. The catalog at your college gives the following information regarding math classes.

A prerequisite for *Calculus III* is *Calculus II*. A prerequisite for *Calculus II* is *Calculus I*. *Linear Algebra* can only be taken after both *Calculus II* and *Fundamentals of Mathematical Proofs* have been taken. A prerequisite for *Fundamentals of Mathematical Proofs* is *Calculus I*. In order to take *Real Analysis I*, a student must have completed *Calculus III* and *Linear Algebra*. A prerequisite for *Real Analysis II* is *Real Analysis I*.

Draw a digraph which models the relationships between the math classes *Calculus I*, *Calculus II*, *Calculus III*, *Fundamentals of Mathematical Proofs*, *Linear Algebra*, *Real Analysis I*, and *Real Analysis II*.

Answer:



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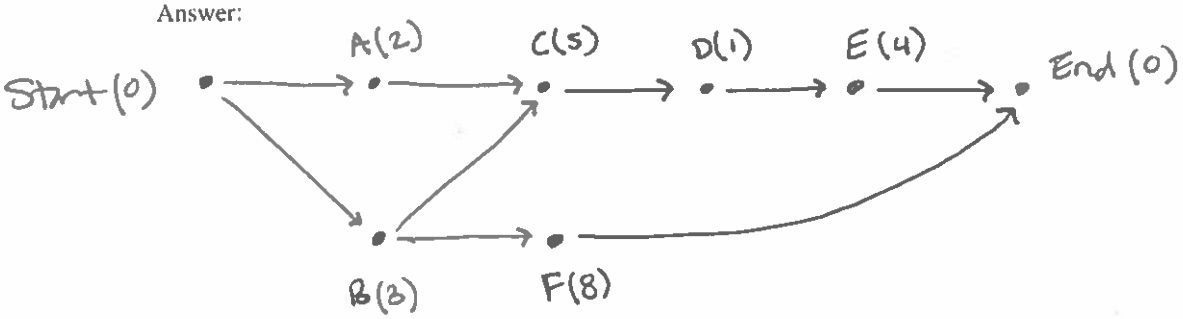
6. A project consists of six tasks labeled A through F. The table shown below gives the processing times and precedence relations for these tasks. Construct the project digraph.

Task	Processing Time	Precedence Relation
A	2	
B	3	
C	5	A, B
D	1	C
E	4	D
F	8	B

Answer:

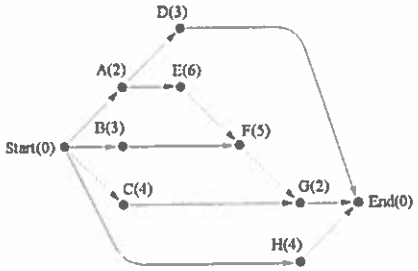


7. Consider the project from problem 6; use the priority list A, B, C, D, E, F to find the project finish time fin using $N = 2$ processors.

Answer: 13

8. Consider the project digraph shown below; apply the *decreasing-time algorithm* to find the project finish time fin using $N = 2$ processors.

Answer: 19



9. Consider the project digraph from problem 8; apply the *critical-path algorithm* to find the project finish time fin using $N = 2$ processors.

Answer: 15

Name:_____
Date:_____

10. It's Saturday morning and you've just learned your parents are coming to visit with your grandmother in one hour! Your dorm room is a complete mess, so you and your two roommates need to clean-up the room as quickly as possible. There are seven independent tasks which need to be completed before the visitors arrive. You and your roommates are all capable of doing any of the tasks, and fatigue is of no worry…you've stocked up on coffee. The table below gives each task and the time that it takes one person to complete it. Assuming that each task is completed by only one person, find the optimal project finish time *opt*. Hopefully you can finish in less than one hour! (Hint: You are guaranteed that a project finish time is optimal is there is zero idle time.)

Answer: 30

Task	Processing Time (minutes)
Make Bed	10
Vacuum Floor	18
Take out Trash	6
Wash Dishes	12
Return Bottles	14
Organize Desk	17
Fold Laundry	13

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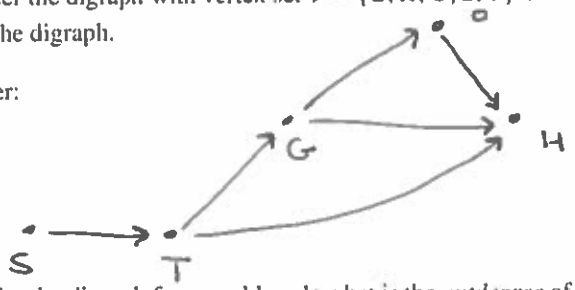
Name:_____
Date:_____

1. Consider the digraph with vertex set $V = \{G, H, O, S, T\}$ and arc set $A = \{GH, GO, OH, ST, TG, TH\}$. Draw the digraph.

Answer:



2. Consider the digraph from problem 1; what is the *outdegree* of vertex G?

Answer: 2

3. Consider the digraph from problem 1; which vertices, if any, are *incident to O*?

Answer: G

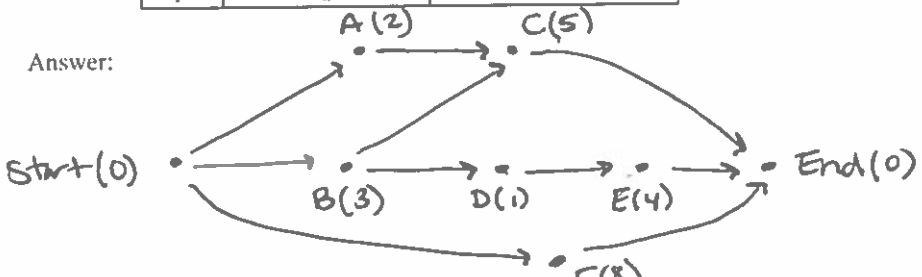
4. Consider the digraph from problem 1; which arcs, if any, are *adjacent to GO*?

Answer: OH

5. A project consists of six tasks labeled A through F. The table shown below gives the processing times and precedence relations for the tasks. Construct the project digraph.

Task	Processing Time	Precedence Relation
A	2	
B	3	
C	5	A, B
D	1	B
E	4	D
F	8	

Answer:



6. Consider the project from problem 5; use the priority list A, B, C, D, E, F to find the project finish time *fin* using $N = 2$ processors.

Answer: 13

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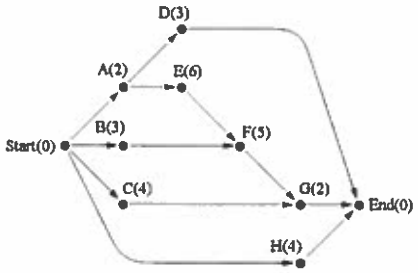
17. Consider the project digraph shown below; apply the *decreasing-time algorithm* to find the project finish time *fin* using $N = 3$ processors.

Answer: 18



18. Consider the project digraph from problem 8; apply the *critical-path algorithm* to find the project finish time *fin* using $N = 3$ processors.

Answer: 15

19. It's Saturday morning and you've just learned your parents are coming to visit with your grandmother in one hour! Your dorm room is a complete mess, so you and your two roommates need to clean-up the room as quickly as possible. There are seven independent tasks which need to be completed before the visitors arrive. You and your roommates are all capable of doing any of the tasks, and fatigue is of no worry…you've stocked up on coffee. The table below shows the task and the time that it takes one person to complete the task. Assuming that each task is completed by only one person, find the optimal project finish time *opt*. Hopefully you can finish in less than one hour! (Hint: You are guaranteed that a project finish time is optimal is there is zero idle time.)

Answer: 45

Task	Processing Time (minutes)
Make Bed	16
Vacuum Floor	29
Take out Trash	11
Wash Dishes	19
Return Bottles	13
Organize Desk	15
Fold Laundry	32

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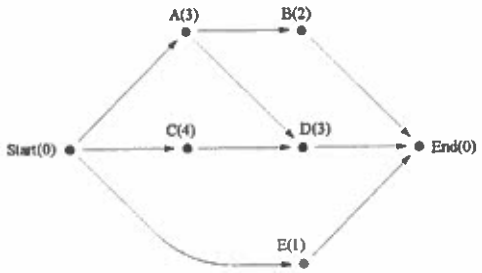
20. Consider the project digraph shown below; you plan on applying the *critical-path algorithm* to complete the project. However, you have a choice of using either $N = 2$ processors or $N = 3$ processors. Is it more efficient to use three processors as opposed to two? Explain.



Answer: It is more efficient to use 2 processors. Finishing time is 7 hours for N=2 or N=3, so more idle time with N=3 processors, which is less efficient.