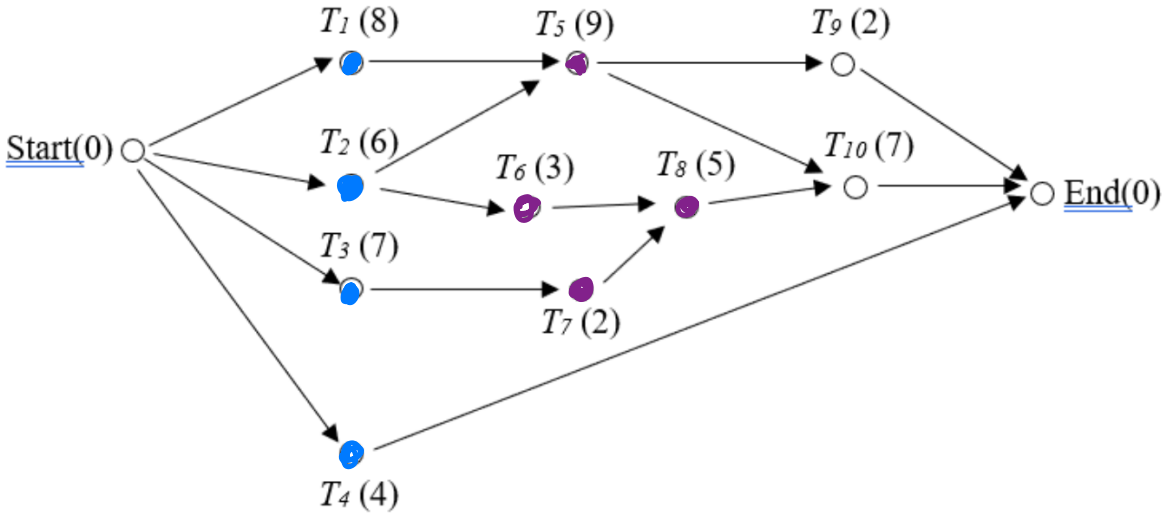
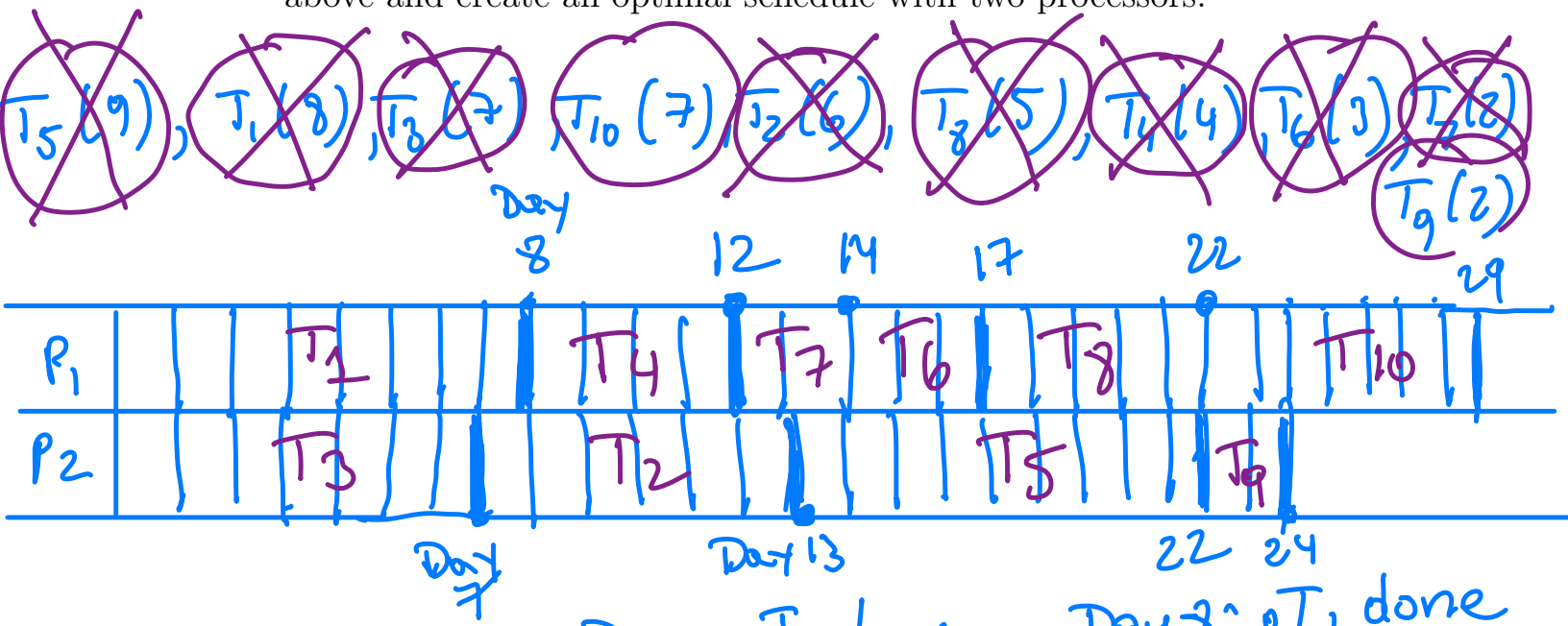
MTH 140: Practice Exam 2

College of Lake County

1. Consider the following digraph.



(a) Use the decreasing time algorithm to create a priority list for the digraph above and create an optimal schedule with two processors.



Day 0: • no tasks done
• T_1, T_2, T_3, T_4 available
• $P_1 \to T_1$ & $P_2 \to T_3$

Day 7: • T_3 done
• T_7 available
• $P_2 \to T_2$

Day 8: • T_1 done
• no new available
• $P_1 \to T_4$

Day 12: • T_4 done
• no new
• $P_1 \to T_7$

Day 13: • T_2 done
• T_5 & T_6 avail
• $P_2 \to T_5$

Day 14: • T_7 done
• no new
• $P_1 \to T_6$

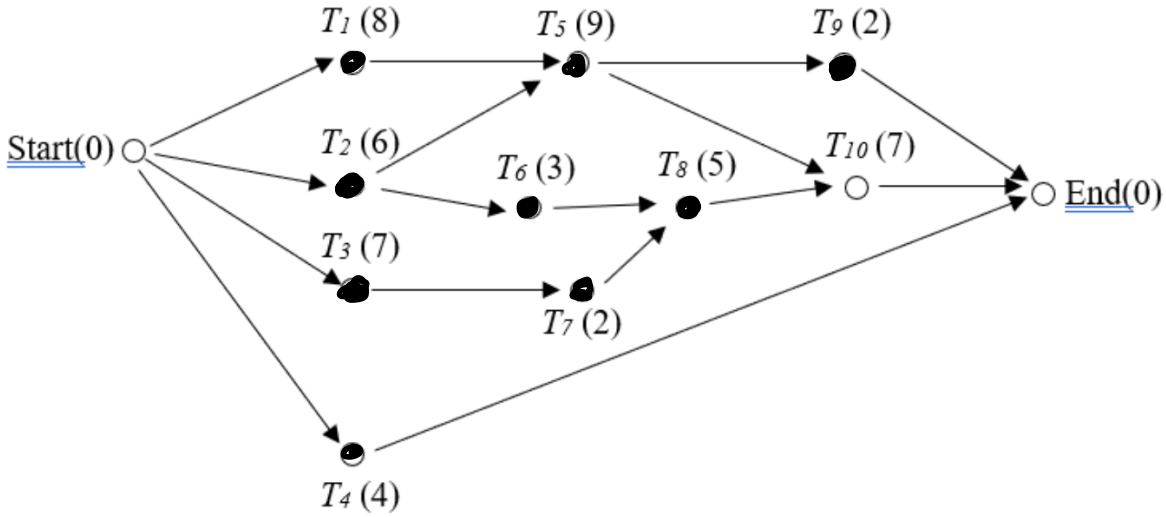
Day 17: T_6 done
T_8 avail.
$P_1 \rightarrow T_8$

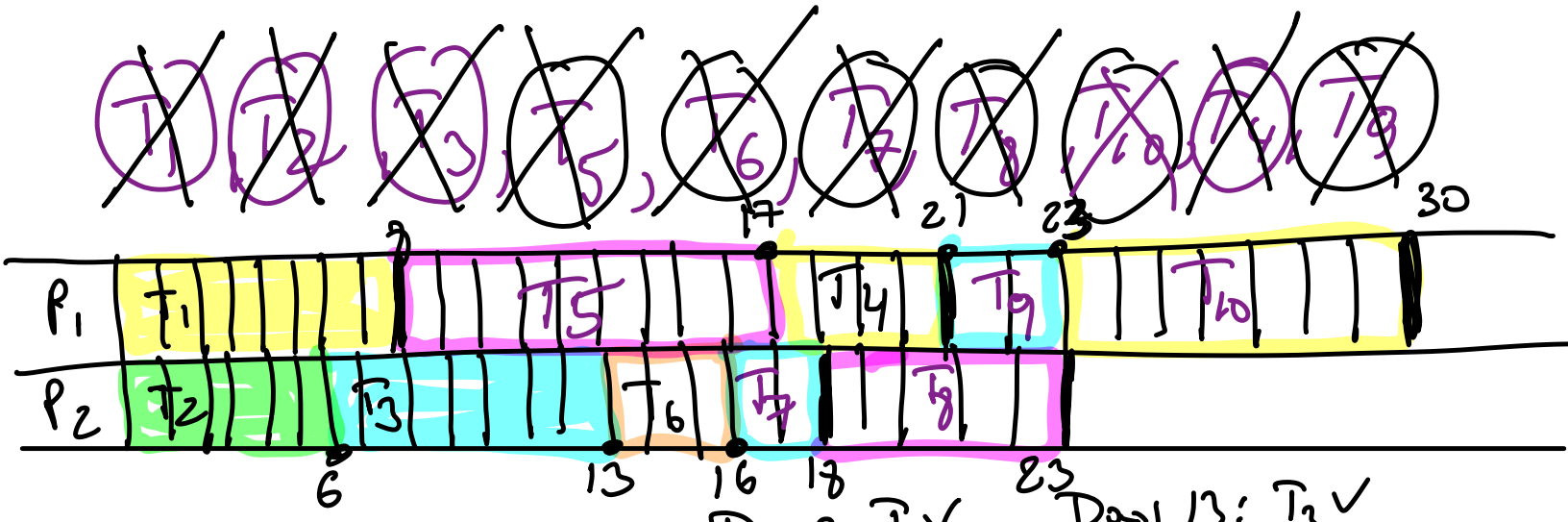
Day 22: T_5 & T_8 done
T_9 & T_{10} avail.
$P_1 \rightarrow T_{10}$
$P_2 \rightarrow T_9$

Day 29 work done!

Answer : 30 days

(b) Use the critical path algorithm to create a priority list and create an optimal schedule with two processors.





Day 0: $P_1 \to T_1$, $P_2 \to T_2$

Day 6: T_2 ✓, T_6 av., $P_2 \to T_3$

Day 8: T_1 ✓, T_5 av, $P_1 \to T_5$

Day 13: T_3 ✓, T_7 av, $P_2 \to T_6$

(c) Which schedule is better?

Day 16: T_6 ✓, $P_2 \to T_7$

Day 17: T_5 ✓, T_9 av, $P_1 \to T_4$

Day 18: T_7 ✓, T_8 av, $P_2 \to T_8$

Day 21: T_4 ✓, $P_1 \to T_9$

Day 23: T_9 & T_8 ✓, T_{10} av, $P_1 \to T_{10}$

2. The table below describes the smoking habits of a group of asthma sufferers:

	Nonsmoker	Light smoker	Heavy smoker	Total
Men	339	63	72	474
Women	343	75	66	484
Total	682	138	138	958

If one of the 958 subjects is randomly selected, find the probability that the person chosen is

(a) A man $P(M) = \frac{474}{958}$

(b) A man who is a heavy smoker. (means both man & heavy smoker)
$P(M \& HS) = \frac{72}{958}$

(c) A nonsmoking woman.
$P(W \& NS) = 343/958$

(d) A woman or a nonsmoking person.
$P(W \text{ or } NS) = P(W) + P(NS) - P(W \& NS) = \frac{484}{958} + \frac{682}{958} - \frac{343}{958}$

(e) A woman given that the person is a light smoker.
$P(W \mid LS) = 75/138$

3. Suppose that A, B are two mutually exclusive events, with $P(A) = 0.3$ and $P(B) = 0.4$. Find P(A or B)

a. 0.7
b. 0.3
c. 0.58
d. 0.12

$P(A \text{ or } B) = P(A) + P(B)$
$= 0.3 + 0.4$
$= 0.7$

4. A single die rolled. Find the probability of each of the following events, and write your answers as fractions.

   (a) The number showing is 3. $P(3) = 1/6$

   (b) The number showing is not 3. $P(\text{not } 3) = 5/6$

   (c) The number showing is even. $P(\text{even}) = 3/6 = 1/2$

   (d) The number showing is greater than 3. $P(\text{"}>3\text{"}) = 3/6 = 1/2$

   (e) The number showing is 3 or even. $P(3) + P(\text{even}) = \frac{4}{6} = \frac{2}{3}$

   not exc.

5. A basketball player hits three-point shots 45% of the time. If she takes 4 shots during a game, what is the probability that she misses the first shot and hits the last three shots?

   a. 0.05
   b. 0.41
   c. 0.5
   d. 0.041

   $P(H) = 0.45$ (hitting)

   $P(M) = 1 - P(H) = 1 - 0.45 = 0.55$

   ↳ missing

   $P(M \& H \& H \& H) =$

6. Let A, B be events, with $P(A) = 0.5, P(B) = 0.8$, and $P(A|B) = 0.40$. Calculate the following probabilities for parts a through d, and give your answer as a decimal rounded to two decimal places. Answer part e as either "yes" or "no":

   (a) $P(B')$ = means $P(\text{not } B) = 1 - P(B) = 1 - 0.8 = 0.2$

   (b) $P(A \text{ and } B) = P(B)\,P(A|B) = (0.8)(0.4) = 0.32$

   (c) $P(A \text{ or } b) = P(A) + P(B) - P(A \text{ and } B) = 0.5 + 0.8 - 0.32$

   (d) $P(B|A) = \dfrac{P(A \text{ and } B)}{P(A)} = \dfrac{0.32}{0.5}$

   (e) Are events A and B independent? Justify your answer by showing what formula you used to decide on the answer.

   no $P(A|B) \neq P(A)$

   $0.4 \neq 0.5$

7. A magazine published the results of an extensive investigation of broiler chickens purchased from food stores in 23 regions. Tests for bacteria in the meat showed that 50% of the chickens were contaminated with campylobacter, 19% with salmonella, and 9% with both.

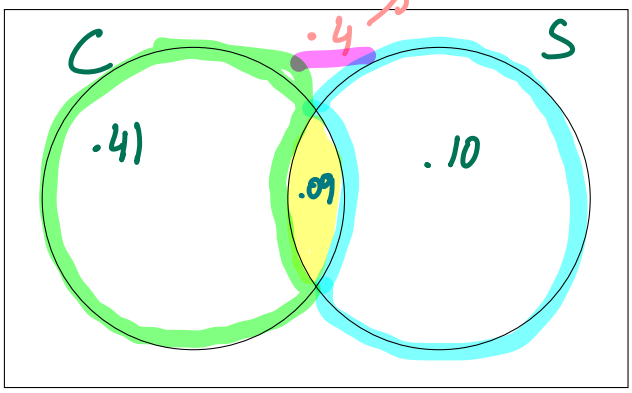
=S

=C

50% - 9% = 41%

19% - 9 = 10%

1 - (.41 + .09 + .10) = .4



(a) Are contamination with the two kinds of bacteria mutually exclusive events? Explain.

NO a chicken can be contaminated w/ both

(b) What's the probability that a tested chicken was not contaminated with either kind of bacteria?

.4

(c) What's the probability that a tested chicken was contaminated with salmonella only?

.10

(d) What's the probability that a tested chicken was contaminated with campylobacter or salmonella?

.41 + .09 + .10 = .6

1. If you randomly select 3 packs of chicken, what is the probability that all 3 are contaminated with salmonella?

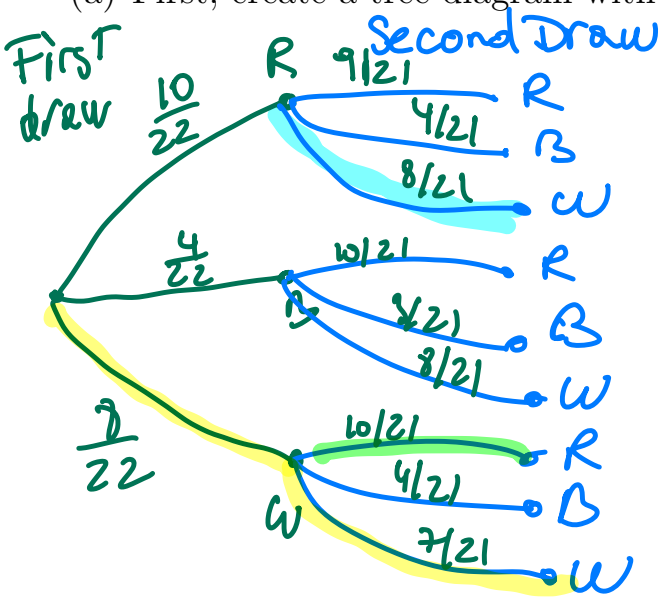
P(S and S and S) = (.19)(.19)(.19)

2. If you randomly select 3 packs of chicken, what is the probability that all 3 are contaminated with with both bacteria?

P(Both & Both & Both) = (.09)(.09)(.09)

8. A jar contains 10 red marbles, 4 blue marbles, and 8 white marbles. If two marbles are drawn randomly from the jar without replacement, find the probability of the given event, and write your answers as fractions.

(a) First, create a tree diagram with probabilities on each possible outcome.



(b) The second ball is red, given that the first ball is white:

$$P(R \mid W) = 10/21$$

(c) The second ball is white, given that the first ball is red:

$$P(W \mid R) = 8/21$$

(d) Both balls are white:

$$P(\text{W and W}) = \frac{8}{22} \cdot \frac{7}{21}$$

9. You are dealt two cards successively (without replacement) from a shuffled deck of 52 playing cards.

Find the probability that the first card is a king and the second card is a queen.

a. 2/13

b. 4/663

c. 1/169

d. 1/13

$$P(K_{1st} \text{ and } Q_{sec}) = P(K_{1st}) \cdot P(Q_{sec} \mid K_{1st}) = \frac{4}{52} \cdot \frac{4}{51} = \frac{16}{2652} = \frac{4}{663}$$