NAME (please print): **SOLUTIONS** .

UTID (EID) : _____

Cohort: 1 2

BA380N Dallas Operations Quiz II

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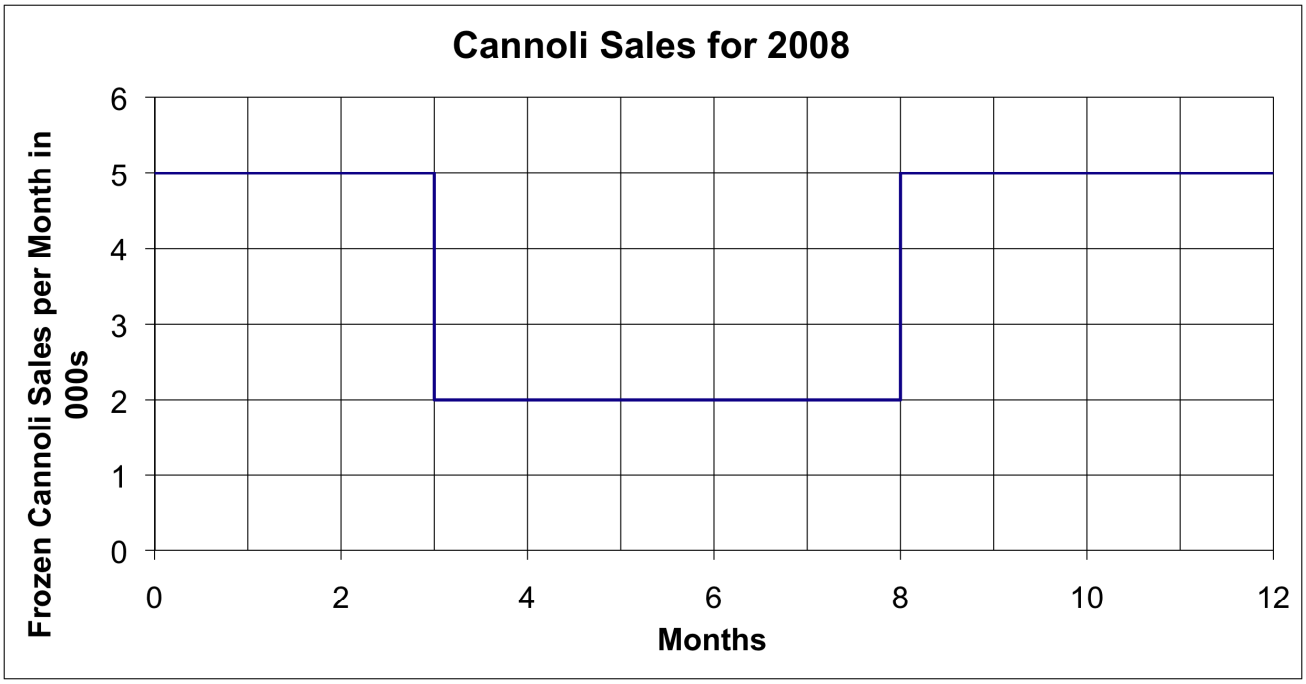
Instructions:

- Count your pages. There should be 12 of them (including 1 z-chart).
- You may use two 8 ½" x 11" "formula sheets." Otherwise, the test is closed-note and closed-book.
- For multiple choice, please select the best answer for each question. For the other questions, please show all of your work and circle your final answer. (Partial credit is possible for the non-multiple choice problems, though not for the multiple choice problems.) For short qualitative questions, please keep them to the space provided (remember: brevity is the soul of wit).
- Make sure to print your name and EID at the top of this page
- You will have 1 hour 45 minutes to complete this exam.

The points are listed for each problem. You will also get 2 points for putting your name, cohort, and EID on the top of this page.

Good luck...

1. Examine the following graph of Frozen Cannoli sales for Cannoli Inc. in 2008.



Frozen cannoli demand is highly seasonal. However, they effectively never spoil, so inventories can be used to smooth out production during the year. In 2008, Cannoli, Inc. (CI) was over-capacitized, so it could easily satisfy all demand. However, the new manager, Santiago Maley wants to try a new approach by using less labor (i.e. lower Cannoli, Inc.'s capacity). You start at the beginning of 2009 with 2000 cannolis in inventory, and you can assume that there are no losses in thruput due to yield or downtime problems. Additionally, you cannot backlog orders. If demand in 2009 follows the pattern of sales in 2008 and the variable cost of each cannoli in inventory is $1.50 (but they are sold for $2.75), please answer the following questions. (Note that freezer storage space is not a constraint.) [5 points per sub-problem]

A. If capacity throughout the year is smooth at 3,500 cannolis per month and you operate at maximum throughput all year round, what will be your maximum inventory during 2009 and when will it occur?

Note: "Kc" = 1000 cannolis

Time	Inventory (000s)
0.0	2K cannolis
1.33	I(1.33) = 2K + (3.5Kc/mo – 5Kc/mo)(1.33 mos) = 0 cannolis
3.0	0 cannolis
8.0	I(8.0) = 0 + (3.5Kc/mo – 2 Kc/mo)(8mos – 3mos) = 7.5 K cannolis
12.0	I(12.0) = 7.5 Kc + (3.5Kc/mo – 5Kc/mo)(12.0 – 8.0 mos) = 1.5 K cannolis

Given this, the maximum inventory will be 7500 cannolis, which occurs at month 8.0.

B. What will be the approximate average time in storage for a frozen cannoli over 2009? (For simplicity, you can neglect the time that any initial inventory has already waited in 2008.)

Looking at the data above,

Time	Avg Inventory	Months
0-1.33	(0 + 2K)/2 = 1K	1.33 mos
1.33-3	0 (starved)	1.67 mos
3-8	(0 + 7.5K)/2 = 3.75K	5 mos
8-12	(7.5K + 1.5K)/2 = 4.5K	4 mos

Iavg = [(1K)(1.33mos) + (0)(1.67mos) + (3.75K)(5mos) + (4.5K)(4mos)]/(12mos)
= 3.17 K

Month	Thruput
0-1.33	5 Kc/mo
1.33-3	3.5 Kc/mo
3-8	2 Kc/mo
8-12	5 Kc/mo

Thruput = [(5.0 Kc/mo)(1.33 mos) + 3.5 Kc/mo(1.67 mos) + 2Kc/mo(5 mos) = 5Kc/mo(4mos)]/12 mos = 3.54 Kc/mo

Flowtime = Iavg/thruput = (3.17 Kc)/(3.54 Kc/mo) = 0.900 months

C. What will be the holding cost for 2009 assuming a holding rate of 20% per year?

Holding Cost/year = h C Iavg = (20%/yr) ($1.5)(3.17Kc) = $951 /year

D. **One of your freezers has permanently broken down leaving you with working freezer space that can hold a maximum of only 2000 cannolis? What will be the lost economic contribution due to a loss of freezer space over 2009 if you don't replace it (to simplify things, you can neglect the impact on economic contribution from inventory on hand at the end of the year)?**

Thruput will only be affected during months 8-12. If the maximum inventory is only 2000 cannolis, then starvation will begin at month = 8 + (0 Kc - 2 Kc)/(3.5 Kc/mo – 5.0 Kc/mo) = 9.33 mos. Hence, from month 9.33 to 12, thruput will be reduced from 5 Kc/mo to 3.5 Kc/mo, implying a loss of 2.67 mos (1.5 Kc/mo) = 4 K cannolis. This translate into a loss of economic contribution of 4K cannolis * ($2.75 -$1.5)/cannoli = $5000.

E. **You have an opportunity to rent a replacement freezer for the year for $3500. Do you rent it or not? Justify your answer.**

$3500 < $5000, so yes. You received an extra bonus point if you mentioned the fact that holding costs would go up as well, but had to be much less than $1500 given the results of part c.

2. Below is a list of activities, their expected durations, the standard deviations (not the variances) of those durations, and each activity's immediate predecessors. The time units for this problem are all expressed in days. [5 points per subproblem]

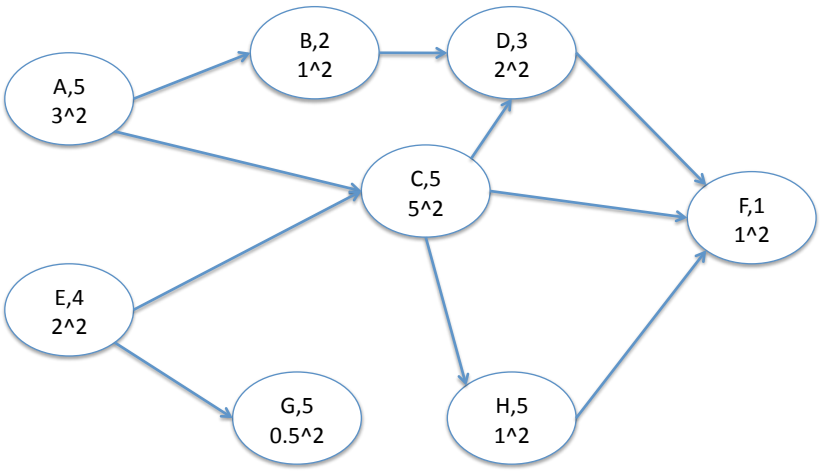
Activity	**Expected Duration**	Std. Deviation	Predecessors	Person Responsible
A	5	3	None	Ann
B	?	?	A	Bob
C	5	5	A,E	Charlie
D	3	2	B,C	Dave
E	4	2	None	Ed
F	1	1	C,D,H	Frank
G	5	0.5	E	Gloria
H	5	1	C	Halle

A. Your in-house expert on activity b, Bob, has given you optimistic and pessimistic estimates of completing activity b for this project of, respectively, 1 and 5 days. However, he thinks that it will most likely be completed in 2 days. What is the expected duration of this activity and its standard deviation?

Exp Duration = (a + 4m + b)/6 = (1 +4*2 + 5)/6 = 2.33 days

Std. Dev. = (b-a)/6 = (5-1)/6 = 0.67 days

B. What is the critical path and P50 for this project's duration? (You can assume that activity B has mean of 2 and standard deviation of 1 for the remainder of this problem. Note that these aren't necessarily the correct answers to part A.)



CP is ACHF → P50 = 5+5+5+1 = 16 days

Note that the only near-critical path is ECHF at 15 days

C. What is the P95 for the duration of this project (in other words, in how many days can you guarantee completing this project with 95% certainty)?

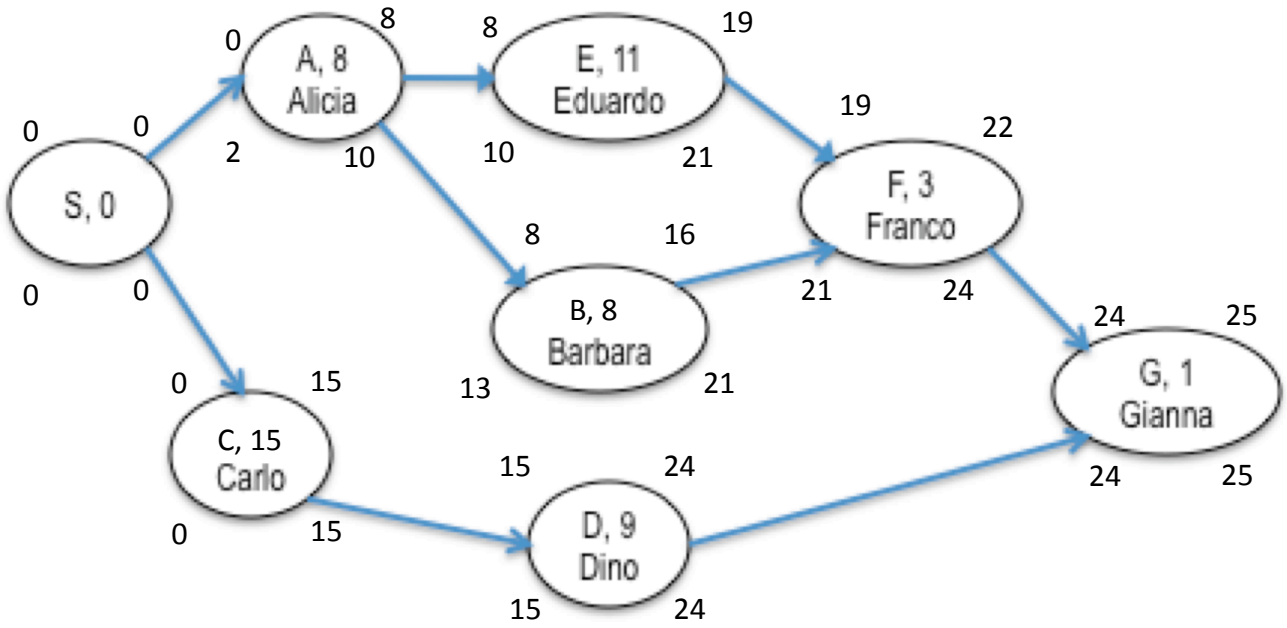
For P95, z = 1.64

Std. Dev. Of CP = sqrt[3^2 + 5^2 + 1^2 + 1^2] = 6 days

P95 = mean + 1.64 * sigma = 16 + 1.64*6 = 25.8 days

Note that the near-cp, ECHF has the same std. deviation, so there is no way that its P95 could be greater than that of the CP.

3. Below is a simplified network diagram of activities for a business start-up project, their expected durations, and the name of the person responsible for each activity. The time units for this problem are all expressed in days. [5 points per subproblem]



A. What is the slack on activity B?

Slack = 21 – 16 = 5 days

B. What is the expected duration of this project if Eduardo is pulled off the project just prior to its commencement and Barbara must complete both hers and Eduardo's activities? (And, no, Barbara cannot work a double-shift!)

CP becomes SABEFG or 0+8+11+8+3+1 = 31 days

4. Below is a list of activities for a project, their expected costs, the standard deviations (not the variances) of those costs, and each activity's immediate predecessors. The cost units for this problem are all expressed in thousands of dollars. [5 points per subproblem]

Activity	**Expected Cost**	Std. Deviation of Cost	Predecessors	Person Responsible
Start	0	0	-	-
W	40	25	Start	Wanda
X	25	10	W	Xena
Y	20	5	W,X	Yoli
Z	50	20	Y	Xandra

A. Please give the P10, P50, and P90 for the cost of this project.

P50 = 40 + 25 + 20 +50 = $135 K
Std dev = sqrt(25^2 + 10^2 + 5^2 +20^2) = $33.9 K

P10= P50 – 1.28*std dev = $135K – 1.28*$33.9K = $91.6K
P90= P50 + 1.28*std dev = $135K + 1.28*$33.9K = $178.4K

B. What is the probability of coming in under $120,000 for the project cost?

Z = ($120K - $135K)/($33.9K) = -0.442 → 33%

5. In the project in problem 4, on week 8, activity W is 80% completed, activity X is 30% completed, activity Y is 50% completed, and activity Z has not yet begun. The planned value for the completion of this project on week 8 is $55,000, but the actual spending at that point has been $45,000. [5 points per subproblem]

A. What is the cost performance index of this project on week 8?

EV = 80% * $40K + 30%*$25K + 50%*20 = $49.5K
CPI = EV/AC = $49.5K/$45K = 110%

B. What is the schedule performance index of this project on week 8?

SPI = EV/PV = $49.5K/$55K = 90%

C. A separate project across town has an SPI of 120% and CPI of 110% at week 10. Please give a short verbal description (1 or 2 sentences should be enough) qualitatively describing the progress of this project.

This project is a bit ahead of schedule and also a bit under budget.

D. For part C, describe qualitatively two reasons that the SPI could be misleading. This answer does not necessarily need to pertain to problem 5 specifically. Bullet points are fine. (Again 1 or 2 sentences should be enough.)

Answers will vary. Often times, the lesser cost activities are done first and out of order with the planning. Another is frankly that the schedule progress might be being reported by the contractor and thus be self-serving. This is why hiring a 3rd-party to measure progress is often helpful. You could also mention the rather bizarre progress on activities X and Y given the precedence relationships in problem 4.

There are 3 points for each multiple choice problem below.

6. Typically, problem areas of real-world project management include
    a. Too little spending in up-front definition and planning
    b. Poor monitoring of project progress
    c. Relying on point estimates of cost and duration, resulting in padding
    d. None of these three areas in real-world project management are typically problems
    e. **All three areas (a,b,c) are typically problems

7. What is the least commonly used of the tools below in project management?
    a. WBS
    b. CPM diagrams
    c. Risk registers
    d. **Inventory Buildup diagrams
    e. Earned value analysis

8. In general, the most effective way of putting a significantly late project back on schedule is to:
    a. Add new employees to the project
    b. Work employees overtime for long periods
    c. **Reduce the scope
    d. Scream at your employees
    e. Commit the project to an earlier completion date

9. An initial project proposal is likely to include all of the following except:
    a. **Earned value analysis
    b. Purpose statement
    c. Stakeholder analysis
    d. Critical assumptions
    e. Initial cost estimates

10. LIFO has the following operational effects vs. FIFO, except for:
    a. LIFO raises maximum waiting time for items in inventory
    b. **LIFO raises average waiting time for items in inventory
    c. LIFO increases spoilage
    d. LIFO increases defects
    e. All of the above operational effects actually occur.

11. Professor Anderson's favorite project management guru is:
    Any answer is okay
    a. Darth Vader
    b. The Great Pumpkin
    c. Yogi Berra

d. Santa Claus (actually, he's really a process guru)
e. Yoda

Extra Credit [2 points]: In problem 4, assume that there is a contingency risk that would raise the expected cost of this project by $500 K (and a standard deviation of $10K) with a 10% probability. If this contingency risk is accounted for, what would the new P95 be for the cost of the entire project?

$635K

Extra Extra Credit: Brook (Brooks or Brookes is acceptable)