

OPERATIONS MANAGEMENT: FINAL EXAM.

COURSE: _____

PROBLEM 1:

The Stone River Textile Mill was inspected by OSHA and found to be in violation of a number of safety regulations. The OSHA inspectors ordered the mill to alter some existing machinery to make it safer (e.g., add safety guards); purchase some new machinery to replace older, dangerous machinery; and relocate some machinery to make safer passages and unobstructed entrances and exits. OSHA gave the mill only 35 weeks to make the changes; if the changes were not made by then, the mill would be fined \$300,000. The mill determined the activities in a PERT network that would have to be completed and then estimated the indicated activity times, as shown in the table below. Construct the PERT network for this project and determine the following:

Activity	Description	Activity Predecessor	Time Estimates (Weeks)		
			a	m	b
a	Order new machinery	—	1	2	3
b	Plan new physical layout	—	2	5	8
c	Determine safety changes in existing machinery	—	1	3	5
d	Receive equipment	a	4	10	25
e	Hire new employees	a	3	7	12
f	Make plant alterations	b	10	15	25
g	Make Changes in existing machinery	c	5	9	14
h	Train new employees	d, e	2	3	7
i	Install new machinery	d, e, f	1	4	6
j	Relocate old machinery	d, e, f, g	2	5	10
k	Conduct employee safety orientation	h, i, j	2	2	2

PROBLEM 2

AZ Office Supply Company operates by stocking a large volume of items in its warehouses and then supplying customer orders. It maintains its inventory levels by borrowing cash from a local bank. The company estimates that its demand for borrowed cash is \$17,000 per day, and there are 305 working days per year. Any money borrowed during the fiscal year must be repaid with interest by the end of the current year. The annual interest rate charged by the bank is currently 9 percent. Any time a loan is obtained from the bank, it changes the company, the total annual cost of the company's borrowing policy, and the number of loans the company will obtain during the year. Also, determine the level of cash on hand at which the company should apply for a new loan given that it takes 15 days for a loan to be processed by the bank.

PROBLEMA 3

You have been selected by the government for a senior position in the ministry of foreign affairs. The minister has instructed you to examine the emigrants to see if they have a contagious disease or not. Assume that the decision will be based on financial considerations. Suppose also that each immigrant with the disease costs the state \$100,000, and that each immigrant who enters to our country and does not have the disease contributes \$ 10,000 to the national economy. Suppose further that 10% of all potential immigrants have the disease. The government can admit all immigrants, not admit them or do tests to see if they have the disease before deciding whether to admit them or not. The test to perform a personal examination, and diagnose the disease costs \$ 100. The positive result implies that the person has the disease. However, 20% of all people who have the disease get negative results in the recognition of it. The government's goal is to maximize, by potential immigrant, the expected benefits less expected costs. Use decision theory, decision trees, to aid in the determination to obtain the following:

- A. Decision tree
- B. Answer the decision to make

PROBLEM 4

A bar located in the city of Quito sells an average of 100 liters of beer a day; the demand follows a normal distribution with a standard deviation of 25 liters of beer per day. The cost for an order is \$ 40 and the beer supplier takes 3 days to deliver an order. The cost of storage per liter of beer is \$ 3 per year. The bar is open 5 days a week for 50 weeks of the year.

- A) (5 points) what is the economic order quantity that the bar must make to your beer supplier and how many orders per year should be made?
- B) (5 points) what is the total annual storage cost without considering a security stock?
- C) (5 points) suppose now that the address of the bar has specified that a service level of 97% is needed. What should be the reorder point?
- D) (5 points) what is the minimum stock or safety level required for a probability to be less than 3%?
- E) (5 points) what is the cost of annual storage of the security stock to ensure the 97% service level?