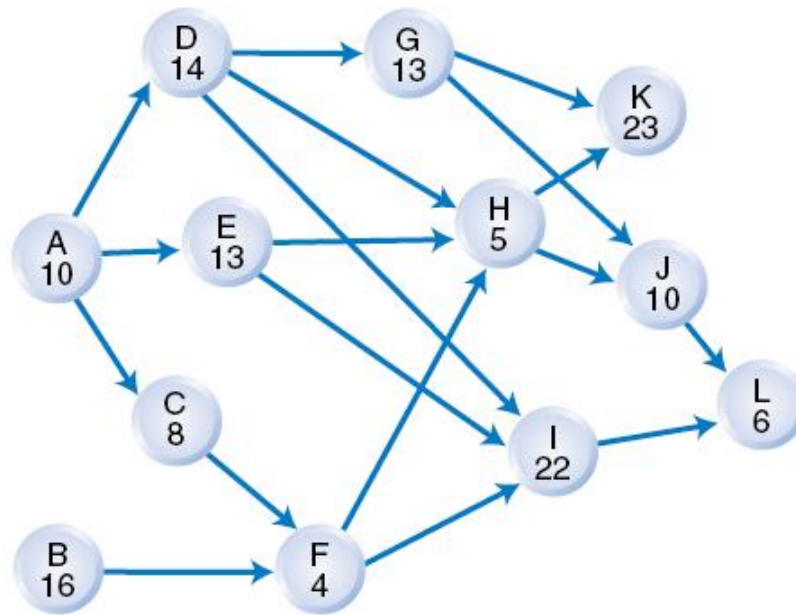


Stochastic Math Models (550.252)
Homework 6 (Due Thursday, October 28, 2011)

General Directions: You must show all work and document any assumptions to receive full credit. When formulating models, make sure to define your variables and label your objective function and constraints. Solve all linear systems using Excel. All other work should be done by hand unless otherwise stated.

1. The grades on a short algebra quiz varied between 30 and 100%. The mean grade was 75% with a standard deviation of 12 percentage points. Assuming the grades are normally distributed, determine
 - (a) The probability that a randomly selected student scores 90% or higher.
 - (b) The probability that a randomly selected student scores 50% or lower.
 - (c) The probability that a randomly selected student scores between 60 and 80%.
 - (d) The median grade for the class.
2. How do the answers to Question 1 change if you assume a triangular distribution? Which distribution do you think is a better fit? (Explain why.)
3. Francisco and Alana Roque are CPAs who have decided to open their own tax consulting service. They must first lease office space and secure the appropriate business insurance. They will then hire two senior tax experts who are up to date on the tax laws and are able to teach junior accountants. Once office space has been leased and the insurance obtained, the Roques can prepare their advertising brochures and hire 15 junior accountants. Training begins after all 15 junior accountants and the two senior tax experts have been hired. After the junior accountants have been trained and the advertising brochures printed, the Roques will begin soliciting clients.
 - (a) Prepare an activity chart for the seven different activities required for the Roques to begin their tax consulting service. Include a column denoting the immediate predecessors for each activity.
 - (b) From your activity chart in part (a) draw a PERT/CPM network for this project.
4. The following PERT/CPM network details an audit of a large nationwide retailer conducted by Peat Marwick. The expected times are in days.



- (a) Use the tabular method to determine the expected time to complete the auditing project.
 - (b) The same personnel from Peat Marwick are assigned to perform activities K and L . Personnel can be reassigned so that activity K can be shortened by one day at the expense of an increase of one day in activity L (and vice versa). What distribution of time spent on activity K and activity L minimizes the overall expected time of the project? What is the minimal expected project completion time in this case?
 - (c) Given your answer to part (b), show how there is more than one critical path. If the standard deviation of each activity in the network is two days, determine the probability that the project will be completed within 60 days for each critical path.
5. Golden West Homes is developing a new modular home model. The table below outlines the activities of the project. Times are expressed in days.

ID	Activity	Immediate Predecessors	Optimistic Time	Most	
				Likely Times	Pessimistic Time
A.	Conduct focus groups	-	14	20	32
B.	Determine key features/options	A	6	8	10
C.	Set out design specifications	B	2	4	12
D.	Draw up blueprints	C	5	6	7
E.	Determine heating requirements	D	2	2	2
F.	Select appointments	C	3	3	9
G.	Arrange for financing	D	4	11	12
H.	Plan marketing campaign	C	3	4	5
I.	Develop manufacturing specifications	E	2	5	14
J.	Obtain material for prototype	E,F	20	35	38
K.	Train workers	I	8	19	24
L.	Build prototype	J,K	10	12	14
M.	Determine selling prices	E,F	1	1	1
N.	Hold dealer meetings	L,M	3	5	7
O.	Prepare advertising literature	H,L,M	7	13	13
P.	Solicit initial orders	N	15	17	31
Q.	Determine order quantities	F	1	2	3
R.	Obtain materials	N,Q	14	26	32
S.	Schedule production	P	1	1	1

- (a) Determine the expected completion time and the critical path for this project.
- (b) Because of production considerations, Golden West will lose \$10,000 if this project is not completed within 114 days. What is the probability that the project will be completed within 114 days?