Name:_____ Score:_____

1(20pts) A decision tree is given on the right where the numbers in parentheses are probabilities and the numbers on the far right are payoffs. Analyze this decision tree to obtain the optimal policy.

2(20pts) You are given the following payoff table for a decision analysis problem

	State of Nature		
Alternative	S_1	S_2	S_3
A_1	10.8	1	0.8
A_2	1	10	8
A_3	8	8	8
Prior Probability	p	0.2	$1-p$

(a) Which alternative should be chosen under the maximum likelihood criterion if $p = 0.3$?

(b) Graph the expected payoff for each alternative, use the graph to find all crossover points, and state the optimal decision.

3(20pts) Suppose that a queueing system has three servers with an exponential interarrival time distribution with a mean of 0.5 hour, and an exponential service time distribution with a mean of 0.5 hour for each server. A customer has just arrived at 8:00 am.

(a) What is the probability that the next arrival will come between 8:00 am and 8:30 am?

(b) Suppose that all three servers are serving customers at 9:00 am, what is the probability that no customer will have service completed before 9:15 am?

4(20pts) Consider a queueing system with the following arrival and service rates: $\lambda_0 = 3,\ \lambda_1 = 2,\ \lambda_2 = 2,\ \lambda_3 = 1,$ $\lambda_n = 0$ for $n \geq 4$, and $\mu_1 = 2,\ \mu_2 = 3,\ \mu_n = 4$ for $n \geq 3$ with the time unit in hours.

(a) Construct the rate diagram for this system.

(b) Find the balance equations for the probability distribution of customers.

(c) Find the steady-state probability distribution.

(d) Find $L,\ \bar{\lambda},\ W$.

5(20pts) The sales manager for a publisher of college textbooks has six traveling salespeople to assign to three different regions of the country. She has decided that each region should be assigned at least one salesperson and that each individual salesperson should be restricted to on of the regions, but now she wants to determine how many salespeople should be assigned to the respective regions in order to maximize sales. The table below gives the estimated increase in sales (in appropriate units).

	Region		
Salespersons	**1**	**2**	**3**
1	35	21	28
2	48	42	41
3	70	56	63
4	89	70	75

(a) Use dynamic programming to find the optimal solution *graphically*.

(b) Solve the problem *algebraically* by constructing the recursive tables for $n = 3,\ n = 2,\ n = 1$.

End