Name:_____ Score:_____

1(20pts) You are given the following payoff table (in unit of dollars):

	State of Nature	
Alternative	S_1	S_2
A_1	30	-10
A_2	10	5
Prior probability	0.4	0.6

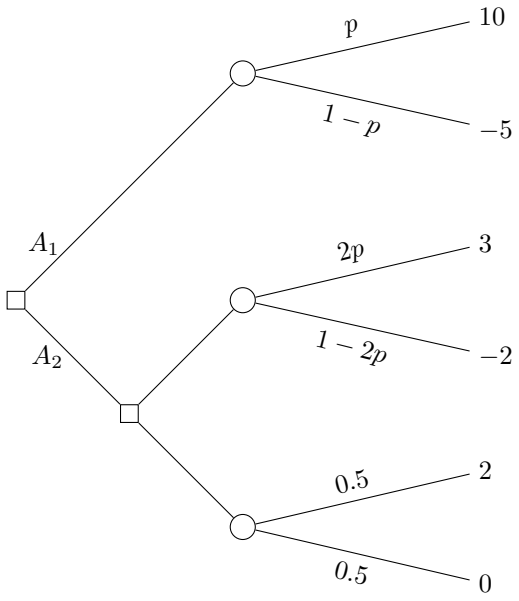
(a) Which alternative should be chosen under the maximin payoff criterion?

(b) Which alternative should be chosen under the maximum likelihood criterion?

2(20pts) Gary owns and operates a gas station which does car repairs on the side. He has one mechanic to do the repair job. Cars needed work done come in at a rate of 5 cars per day. If there are 3 or fewer cars in the shop, the mechanic works on them with an average repairing time of 2 hr. per car. If there are more than 3, Gary pitches in while running the gas station, in which case, it takes about 1 hr. 20 min. for each repair. The gas station has only 4 slots to park cars waiting to be repaired and its mechanical shop is open 8 hours each day. Assume both the arrival and service processes are exponentially distributed. Construct a rate diagram and find the fraction of time the mechanic is busy.

3(20pts) In the month of January it snows 15 percent of the time for a small city. The weather forecast of a radio station was 80 percent correct. That is, when it snowed the station only called it 80 percent of the time, when it did not snow the station forecasted it would snow 20 percent of the time. Find the percentage of the January days the radio station forecasted to snow, and the percentage of the snow day when the station predicted to snow.

4(20pts) You need to choose between alternatives A_1 and A_2 in the decision tree as shown.



For Math428 Students: Find the optimal action if $p = 0.25$.

For Math828 Students: Find the range of p so that A_1 is the optimal alternative.

5(20pts) A neighborhood pharmacy has one pharmacist on duty during its open hours. It handles two types of prescription: call-in order at a mean rate of 3 per hours and walk-in order at a mean rate of 2 per hours. The pharmacists can fill 7 prescriptions per hour on average. Both types of the order and the service are exponentially distributed and are independent of each other.

(a) Sketch the rate diagram for the queueing system, and find the expected time a prescription takes to be filled. (For M/M/1 model, here are some of the formulas: $L = \frac{\lambda}{\mu-\lambda}, L_q = \frac{\lambda^2}{\mu(\mu-\lambda)}$.)

(b) It is a common practice that if there is a walk-in customer, the pharmacist will stop working on any call-in order and work on the walk-in order instead, in which the call-in order will take the same amount of time to fill due to the lack of memory for the Poisson process. Sketch the rate diagram for the walk-in queueing system, and find the expected waiting time for walk-in customers.

5 Bonus Point Question: Continue on Problem #5: Find the average time a call-in order takes to be filled. (Hint: Find the proportion of the walk-in order and the proportion of the call-in order respectively first.)

End