Name

Please be neat and show all your work so that I can give you partial credit. GOOD LUCK.

Question 1
Question 2
Question 3

Total
1. A professor continually gives exams to her students. She can give three possible types of exams, and her class is graded as either having done well or badly. Let $p_i$ be the probability that the class does well on a type $i$ exam, and suppose that $p_1 = 0.3$, $p_2 = 0.6$ and $p_3 = 0.9$. If the class does well on an exam the next exam is equally likely to be any of the three types. If the class does badly, then the next exam is always type 1. What proportion of exams are of type 1 in the long run?
2. Cars at a washing facility have to go through a washing station and then a drying station. These stations can only serve one car at a time. If an arriving car finds the washing station busy, it has to wait. After being washed, it can move to the drying station immediately if that station is free; if not, it has to remain and wait at the washing station. The washing and drying times are exponentially distributed with rates 3 and 4 respectively. Suppose car A arrives at the facility and finds another car being washed. What is the expected duration that car A spends at the facility?
3. (40) Customers come to a store according to a Poisson process of rate 60 per hour. Assume that the 25% of the customers are men and 75% percent of the customers are women.

(10) (a) What is the probability that the next arriving customer is a man?

(10) (b) What is the probability that at least one man comes in an hour?

(10) (c) Given that 40 women came in an hour what is the expected number of customers who have come during the same one hour?

(10) (d) Given that 50 customers came in one hour, what is the probability that 20 of them were men?