Midterm 2

Statistics - NYU, Summer 2016
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[1] In a large corporation, 80% of the employees are men and 20% are women. The highest levels of education obtained by the employees are graduate training for 10% of men, undergraduate training for 30% of men, and high school training for 60% of the men. The highest levels of education obtained by the employees are graduate training for 15% of women, undergraduate training for 40% of women, and high school training for 45% of the women.

a) What is the probability that a randomly chosen employee will be a woman with only a high school degree? (6pt)

b) What is the probability that a randomly chosen employee will not have graduate training? (6pt)

c) What is the probability that a randomly chosen employee who has graduate training is a woman? (6pt)

d) What is the probability that a randomly chosen employee has not had graduate training is a man? (6pt)

[2] A long-distance taxi service owns three vehicles. These are of different ages and have different repair records. The probabilities that, on any given day, each vehicle will be available for use are 0.90, 0.90, and 0.80. Whether one vehicle is available is independent of whether any other vehicle is available. Let X be a random variable denoting the number of vehicles available for use on a given day.

a) List all possible values that X can assume? (6pt)

b) Find the probability distribution of X? Also find $P(X = 0 \mid X \leq 2) =?$. (6pt)

c) If each vehicle in use raise \$650 revenue on average (per day), find the expected revenue of this company for a randomly chosen day? (6pt)

d) Find the probability that the number of days with at most two (two inclusive) vehicles in use will be less than 30 out of the next 90 days? (6pt)

[3] A pizza delivery service delivers to a campus dormitory. Delivery times follow a normal distribution with a mean of 20 minutes and a standard deviation of 4 minutes. Assume that delivery times are independent of each other.

a) What is the probability that a delivery will take between 15 and 25 minutes? (6pt)

b) 90% percent of the time, delivery will take less than how many minutes? (6pt)

c) Find the shortest range of times that includes 60% of all deliveries from this service? (6pt)

d) The service do not charge for the pizza if delivery takes more than 30 minutes. What is the probability of getting at least one free pizza if a student plans to order pizza for five consecutive evenings? (6pt)

[4] The following table displays the joint probability distribution of two discrete random variables X and Y.

$Y(row)/X(column)$	1	2	3
0	.10	.12	.06
1	.05	.10	.11
2	.02	.16	.28

a) Determine the marginal probability distribution of Y.(6pt)

b) Compute the expected value and the standard deviation of Y? (6pt)

c) Compute the expected value of Y given that $X = 3$, i.e. $E(Y|X = 3) =?$ (6pt)

d) For $T = Y^3 + 2Y$, compute the expected value of T, i.e. $E(T) =?$ (6pt)

e) Compute the expected value of $W = 5X + 2Y$ given that $X + Y = 4$, i.e $E(W|X + Y = 4) =?$ (6pt)