MATH 324 10/04/2016

Midterm (Practice)

First Name_____ Last Name_____

1. Consider the following observations on shear strength of a joint bonded in a particular manner:

30	33	66	81	22	40	16	73	36	4	110

a) Determine the values of the sample mean, sample variance and sample median. (20 points)

b) Calculate a trimmed mean by deleting the smallest and largest observations. (5 points)

2. A sample of 20 glass bottles of a particular type was selected, and the internal pressure strength of each bottle was determined. Consider the following sample information:
Median = 202 Lower fourth (i.e., Q1) = 196 Upper fourth (i.e., Q3) = 216
Three smallest observations: 125, 188, 194
Three largest observations: 221, 230, 250
Are there any outliers in the sample? Any extreme outliers? (15 points)

3. A box in a certain supply room contains four 40-W lightbulbs, five 60-W bulbs, and six 75-W bulbs. Suppose that three bulbs are randomly selected. What is the probability that exactly three of the selected bulbs are rated 75-W? (15 points)

4. Police often set up sobriety checkpoints—roadblocks where drivers are asked a few brief questions to allow the officer to judge whether or not the person may have been drinking. If the officer does not suspect a problem, drivers are released to go on their way. Otherwise, drivers are detained for a Breathalyzer test that will determine whether or not they will be arrested. The police say that based on the brief initial stop, trained officers can make the right decision 80% of the time. Suppose the police operate a sobriety checkpoint after 9 p.m. on a Saturday night, a time when national traffic safety experts suspect that about 12% of drivers have been drinking.

a) What's the probability that any given driver will be detained? (15 points)

b) What's the probability that a driver who is detained has actually been drinking? (15 points)

5. Suppose that only 25% of all drivers come to a complete stop at an intersection having flashing red lights in all directions when no other cars are visible. What is the probability that, of 20 randomly chosen drivers coming to an intersection under these conditions,

a) At most 6 will come to a complete stop? (10 points)

b) Exactly 6 will come to a complete stop? (10 points)

6. Real estate ads suggest that 60% of homes for sale have garages, 30% have swimming pools, and 18% have both features. What is the probability that a home for sale has garage but no pool? (15 points)

7. You draw a card from a deck. If you get a red card, you win nothing. If you got a spade, you win $5. For any club, you win $10 plus an extra $20 for the ace of clubs. Define random variable X as the amount you win at one game.

a) What is the pmf of X? (15 points)

b) Find expected value and standard deviation of X. (15 points)