# Ma 320 Test − Section 2

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Calculators and a single $8^{1}\!/_{2}$ by 11 cribsheet can be used.

**1.** (15 points) The scores on a math test for 10 students are given below. Calculate the sample mean and the sample standard deviation for these data. What percentage of the observations is within one standard deviation of the mean?

| | | | | |
|---|---|---|---|---|
| 97 | 85 | 97 | 64 | 73 |
| 84 | 78 | 80 | 92 | 88 |

**2.** (15 points) Graph the empirical distribution function (e.d.f.) for the data in the previous problem. Also, find the sample mode and the sample median.

**3.** (15 points) Sales data for a travel agency that sells vacation cruises to married couples or single individuals is given in the following frequency or contingency table. Construct a relative frequency table for the data, complete with marginal probabilities. Find the probability that a sale was for Cruise B given that the purchaser was a married couple. Find the probability that a customer was either single or else chose Cruise C. Were the choices of vacation cruise independent of marital status? Support your answer mathematically.

Vacation Cruises

| Cruise | Married | Single |
|---|---|---|
| A | 20 | 50 |
| B | 140 | 10 |
| C | 45 | 15 |

**4.** (15 points) Following is a frequency table of the numbers of books in 51 orders to a wholesale book dealer. Construct a histogram for these data. How many classes did you use in the histogram? What is the class mark for each class? What percentage of the orders is less than or equal to 14?

| Numbers of books | Frequency |
|---|---|
| 0.5 to 7.5 | 24 |
| 7.5 to 14.5 | 20 |
| 14.5 to 21.5 | 4 |
| 21.5 to 28.5 | 2 |
| 28.5 to 35.5 | 1 |

**5.** (15 points) The probability of rain varies from day to day as a random variable with the following cumulative distribution function:

$$F(x) \;=\; \begin{cases} 0 & \text{for } x \le 0 \\ 2x - x^2 & \text{for } 0 < x < 1 \\ 1 & \text{for } x \ge 1 \end{cases}$$

Find the probability that on a randomly selected day, the probability of rain will be less than 0.25. Also, find the probability that the probability of rain will be between 0.50 and 0.75. (*Hint*: Drawing a graph may be useful.)

**6.** Essay (5 points) In a short paragraph, describe three characteristics of discrete random variables.

**7.** Extra credit (5 points) Give an interesting example of a binomial random variable other than flipping a coin. Explain why it is a binomial random variable and calculate three probabilities for it using the binomial distribution function.