# MTH 370-01

Exam 1– Winter 2010 Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**You must show your work to receive full credit.**

1. [9 pts] The following table shows data on the major earthquakes around the world that took place in 1998:

**Date Location Magnitude**

Jan. 4 Loyalty Islands region (S. Pacific Sea) 7.4

Jan. 30 Near coast, northern Chile 7.0

March 25 Balleny Islands region 7.7

March 29 Fiji Islands region 7.2

April 1 Off coast, southern Chile 7.0

May 3 Southeast of Taiwan 7.4

July 16 Santa Cruz Islands (S. Pacific Sea) 7.1

July 17 Papua New Guinea 7.1

Aug 4 Near coast of Ecuador 7.1

Aug. 20 Bonnin Islands, Japan 7.0

Nov. 9 Banda Sea, near Indonesia 7.0

Nov. 29 Ceram Sea, near Indonesia 7.8

Nov. 29 Molucca Sea, Indonesia 7.6

a. [6 pts] Represent the magnitude data with a frequency chart and a histogram, treating the grouping the data into (unequal-size *discrete*) classes 7.0, 7.1, 7.2-7.3. 7.4-7.6, 7.7-7.8

b. [3 pts] Find the grouped mean of the data in (a).

2. [16 pts] For the following data:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 11 | 20 | 33 | 45 | 52 | 30 | 27 |
| 21 | 38 | 42 | 28 | 25 | 79 | 60 |
| 14 | 35 | 100 | 23 | 88 | 58 |  |

a. [3 pts] Draw an (ordered) stem and leaf plot.

b. [10 pts] Find the five number summary.

c. [3 pts] Draw a box plot.

3. [6 pts] For the following data, compute the *sample mean* and *standard deviation*, displaying the expressions you computed, and rounding final answers to the nearest 10th:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 2 | 3 | 5 | 6 | 7 |
| 7 | 8 | 10 | 10 | 12 |

4. [8 pts] 100 students at a midwestern university were canvassed and asked the number of hours they spent partying during the past week. The data from their responses had a mean of 6.4 hours with a standard deviation of 4.4 hours. Based on this data, what kind of estimate would you make of:

a. [4 pts] the number of hours another randomly selected student from the university would say s/he spent partying the past week? Give or take about how much?

b. [4 pts] the average number of hours all students at this university spent partying the past week? Give or take about how much?

5. [9 pts] The following table shows that way employees at a company voted about paying high salaries to CEOs:

|  |  |  |
| --- | --- | --- |
|  | For | Against |
| Male | 15 | 45 |
| Female | 4 | 36 |

a. [6 pts] Find the probabilities that a randomly selected employee:

i. voted for the proposal,

ii. voted for the proposal, given the employee was male,

i. was female, given the employee voted against the proposal.

b. [3 pts] Would you say that the employee’s gender and how s/he voted are independent of one another? Explain (mathematically) why/why not.

6. [14 pts] A coin is weighted so that heads are twice as likely to be tossed as tails.

a. [2 pts] What is the probability when the coin is tossed once, a head is tossed?

b. [12 pts] Find the probabilities that when the coin is tossed three times:

i. all tosses are heads,

ii. all tosses are the same,

iii. exactly two heads are tossed,

iv. at least one tails is tossed.

7. [14 pts] In a small town, a group of people were selected at random and asked which of two sports (football and golf) they watched on TV, with the following results: 80% watched at least one of the sports, 70% watched football, and 40% of the football watchers also watched golf.

a. [4 pts] Construct a Venn diagram to model this data.

b. [10 pts] Find the likelihood that a randomly selected person in the group:

i. watched both sports,

ii. watched golf,

iii. watched only golf,

iv. watched neither one of the sports.

v. watched football, given s/he watched golf

8. [12 pts] Given  and  are events such that  and , find ,  and  if:

a.  and  are independent events,

b.  and  are mutually exclusive events.

9. [12 pts] Suppose the probability that 55% of the students graduating from Suburban State are female, 80% of the male graduates have student loans to pay off, and 60% of the female students do. Draw a tree diagram, and find the probabilities that a student graduating from the school:

a. is male and has loans to pay off,

b. has loans to pay off,

c. is male or has loans to pay off,

d. is male, given the student has loans to pay off.

10. [8 pts] A message is coded into the binary symbols, and at each step, either a 0 or a 1 is sent over a communication channel; the probability a 0 is sent is 0.4. The channel, however, has a random error that changes a 1 to a 0 with probability 0.1, and changes a 0 to a 1 with probability 0.2.

a. Draw a tree diagram to illustrate the situation (for a single digit sent and received).

b. What is the probability a 0 is sent and received?

c. What is the probability a 0 is received?

d. If a 0 is received, what is the probability a 0 was sent?