

Directions: Answer the following problems in the space given showing all relevant work – *please write neatly!*

1. ( $1.5 + 1.5 + 1.5 + 2.5 = 7$  points) A survey of students at a certain college showed that **60%** of them read a daily newspaper (N), and that **40%** of them read a weekly news magazine (M). Further, given that a student reads a daily newspaper, the chance that s/he reads a weekly news magazine is **50%**.

(a) What is the probability that a randomly selected student reads both? Show all work.

Answer \_\_\_\_\_

(b) What percentage of the students read at least one? Show all work.

Answer \_\_\_\_\_

(c) What proportion of the students read neither? Show all work.

Answer \_\_\_\_\_

(d) Given that a randomly selected student reads a weekly news magazine, what is the probability that s/he reads a daily newspaper? Show all work.

Answer \_\_\_\_\_

2. ( $2 + 3 = 5$  Points) Let  $X$  be the number of dots on one roll of a fair die. Find the following showing all work and needed formulas.

(a)  $E(X) =$  \_\_\_\_\_

(b)  $E(X^2) =$  \_\_\_\_\_

3. ( $2 + 2 + 2 + 1.5 + 2.5 = 10$  Points) A recent survey conducted by the Environmental Protection Agency in **20** regions of Chicago yielded the following measurements of lead in parts per billion (ppb).

**21 24 29 23 17 20 26 22 18 18 27 25 22 15 29 21 35 30 19 27**

- (a) Make a Stem plot (Stem and Leaf Plot) of these data. Be sure to break the 20's into two groups and do the same for the 30's.

- (b) Give the Five-number summary for these data, showing any needed calculations.

\_\_\_\_\_

- (c) Find the mean of these data, showing all work.

Answer \_\_\_\_\_

- (d) Given that the standard deviation (SD) of these data is **5.09**, what interval corresponds to 'within two SD's of the mean'? Show your calculations.

Answer \_\_\_\_\_

- (e) These data are grouped into the table below at right. Using the table (grouped data), find the **grouped mean** for these data. Show all work.

Interval	Frequency
<b>12-18</b>	<b>4</b>
<b>19-23</b>	<b>7</b>
<b>24-26</b>	<b>3</b>
<b>27-31</b>	<b>5</b>
<b>32-38</b>	<b>1</b>

Answer \_\_\_\_\_

4. (5 Points) The Environmental Protection Agency (EPA) has found that the quality of the air we breathe is often unhealthy because of automobile pollution, and so requires that all automobiles be tested periodically for emission of excessive amounts of pollutants. When tested properly, 98% of the cars that emit excessive amounts of pollutants will fail (that is, the test indicates high pollution). However, 10% of the cars that do not emit excessive amounts of pollutants will also fail. In one state it is known that 12% of all cars emit excessive amounts of pollutants. What is the probability that a car that fails the test actually emits excessive amounts of pollutants? Show all work.

Answer \_\_\_\_\_

5. ( $3.5 + 2 + 2.5 = 8$  points) A lab technician knows that two of the eight pints of blood in the blood bank contain Type A Rh-positive blood. The technician selects two of the pints at random without replacement. Let  $X$  be the number of pints of Type A Rh-positive blood obtained. Express your answers below as fractions or keep 4 decimal places.

(a) Give the probability table for  $X$ . Show all work.

(b) Find the expected value  $\mu_X$  (of the number of pints of Type A Rh-positive blood). Show all work.

Answer \_\_\_\_\_

(c) Find the standard deviation  $\sigma_X$  (of the number of pints of Type A Rh-positive blood). Show all work.

Answer \_\_\_\_\_