

Math 206 - 2nd Final Exam

May 18, 2011

Name key

Score _____

Show all work. Supply explanations where necessary. Use only a compass and a straightedge for constructions. For each construction, the steps you follow must be apparent.

1. A letter is selected at random from the first box and placed into the second box. Then a letter is selected at random from the second box.

MERRY

XMAS

- (a) (3 points) What is the probability that the letter R is selected from the second box?

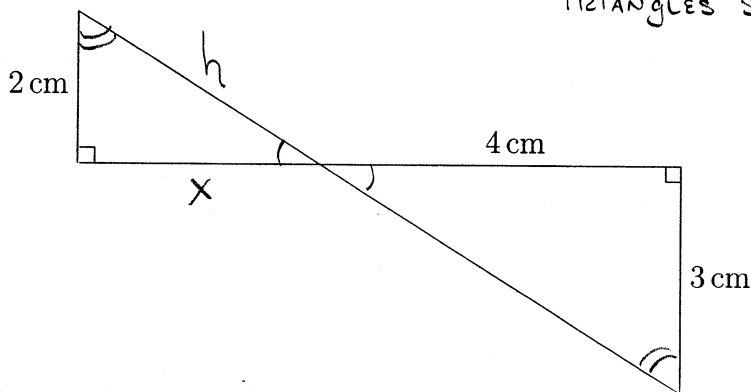
$$\frac{2}{5} R \quad \frac{1}{5} R$$

$$\text{Prob is } \frac{2}{5} \times \frac{1}{5} = \frac{2}{25}$$

- (b) (2 points) What are the odds in favor of selecting a Y from the first box?

$$\text{Prob is } \frac{1}{5} \Rightarrow \text{Odds are } \frac{1}{4}$$

2. (6 points) Find the perimeter of the smaller triangle. Write your final answer in inches rounded to the nearest tenth. (2.54 cm = 1 in)



TRIANGLES SIMILAR BY AAA.

$$\frac{3}{2} = \frac{4}{x}$$

$$\Rightarrow 3x = 8$$

$$x = \frac{8}{3} \text{ cm}$$

$$2 + \frac{8}{3} + \frac{10}{3} = 8 \text{ cm}$$

$$h = \sqrt{2^2 + \left(\frac{8}{3}\right)^2} = \frac{10}{3} \text{ cm}$$

$$\frac{8 \text{ cm}}{1} \times \frac{1 \text{ in}}{2.54 \text{ cm}} = 3.1 \text{ in}$$

3. (3 points) The organizers of a charity event have planned the following game:

Contestants will pay \$5 to randomly select a bill from a box containing one \$100 bill, two \$20 bills, two \$10 bills, five \$5 bills, and ninety \$1 bills. ← 100 BILLS TOTAL.

On average, how much should the event organizers expect to make for each person who plays the game?

$$E = \$100 \left(\frac{1}{100} \right) + \$20 \left(\frac{2}{100} \right) + \$10 \left(\frac{2}{100} \right) + \$5 \left(\frac{5}{100} \right) + \$1 \left(\frac{90}{100} \right)$$
$$= \frac{275}{100} = \$2.75$$

ORGANIZERS SHOULD EXPECT TO MAKE

$$5 - 2.75 = \boxed{\$2.25 \text{ per person}}$$

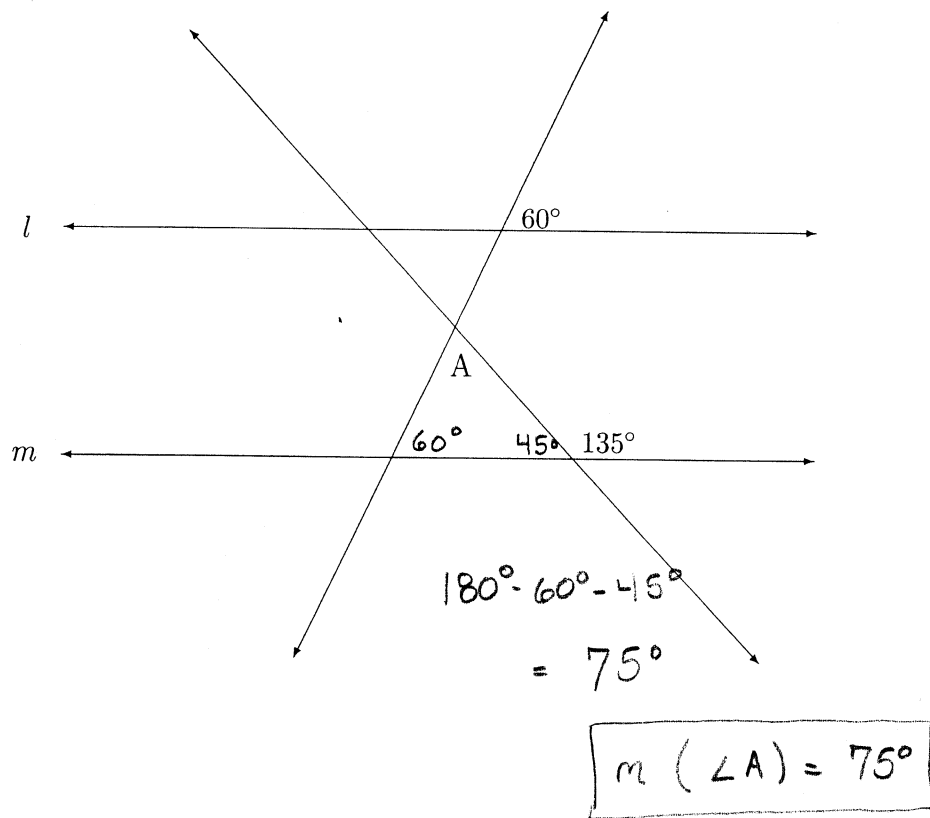
4. (2 points) Find the measure of each interior angle of a regular nonagon.

$$\frac{(9-2)180}{9} = \frac{7(180)}{9} = \boxed{140^\circ}$$

5. (3 points) The mean weight of seven tackles on a football team is 230lb, and the mean weight of the four backfield members is 190lb. What is the mean weight of the 11-person team?

$$\frac{7 \cdot 230 + 4 \cdot 190}{11} = \frac{2370}{11} \approx \boxed{215.5 \text{ lbs}}$$

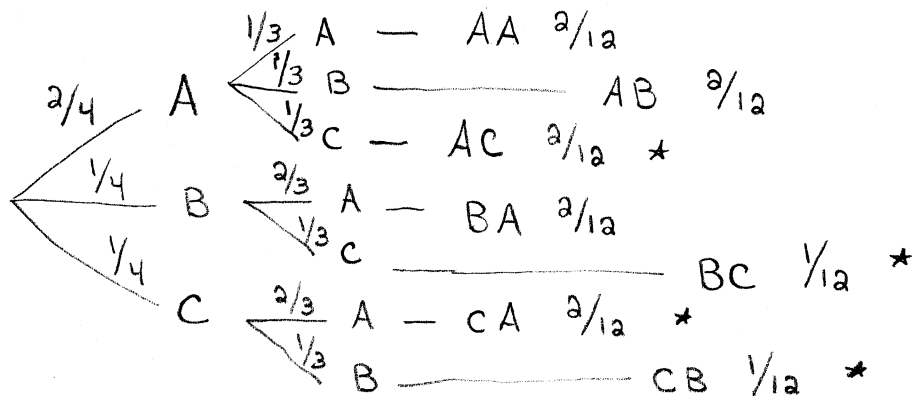
6. (4 points) In the figure below, line l and line m are parallel. Find the measure of the angle A .



7. Two letters are selected at random, one at a time without replacement, from the following box.

A A B C

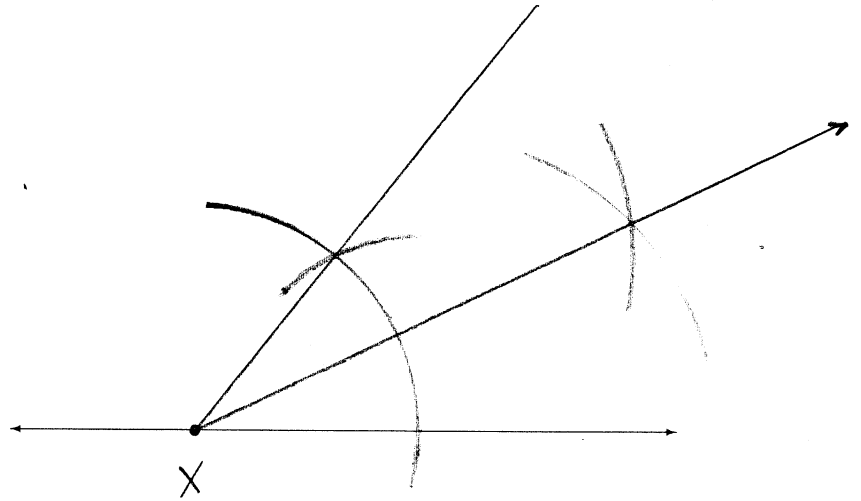
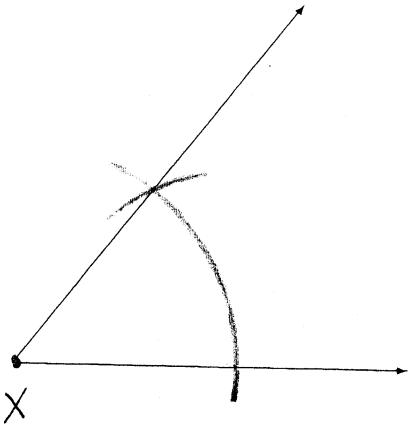
- (a) (4 points) Sketch the probability tree diagram associated with this two-stage experiment and find the probability of each path.



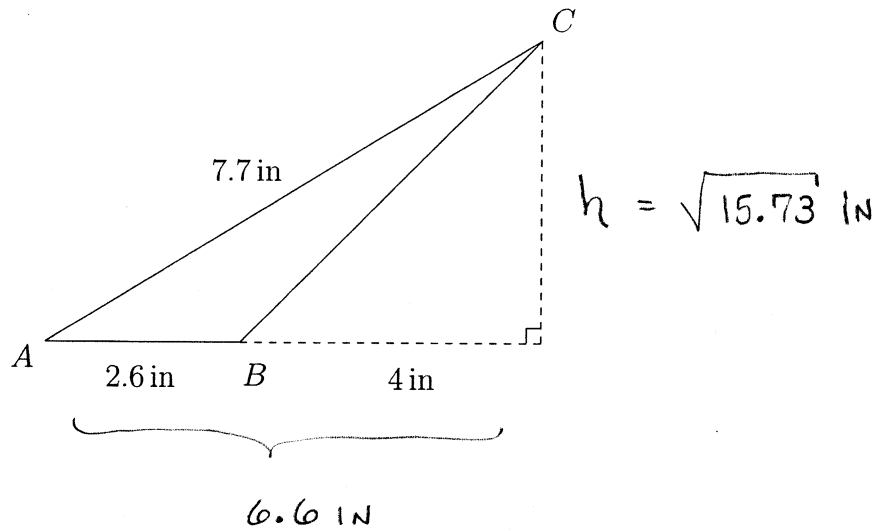
- (b) (1 point) What is the probability that exactly one of the selected letters is a C?

$$\frac{2}{12} + \frac{1}{12} + \frac{2}{12} + \frac{1}{12} = \frac{6}{12} = \boxed{\frac{1}{2}}$$

8. (5 points) Copy the given angle so that its initial side lies on the given line. Then bisect the copied angle.



9. (5 points) Find the area of triangle ABC .



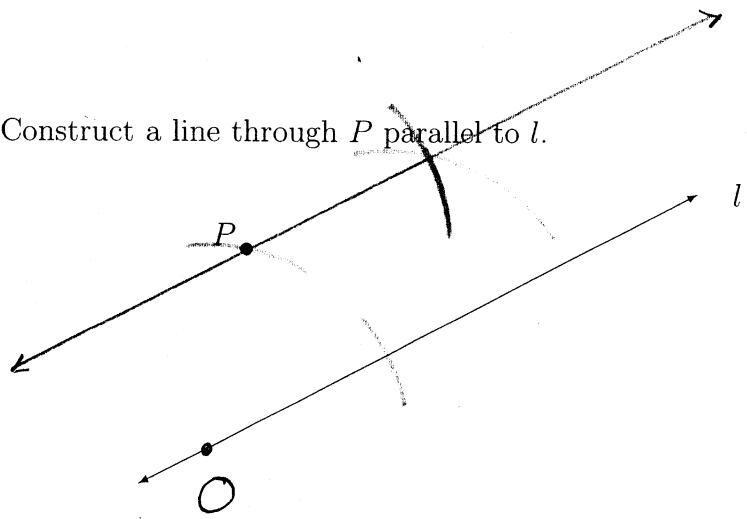
$$h^2 = 7.7^2 - 6.6^2 = 15.73$$

$$A = \frac{1}{2}(2.6)\sqrt{15.73} \approx 5.156 \text{ in}^2$$

10. (3 points) Convert 321,654 in to miles. Round your final answer to the nearest hundredth.

$$\frac{321654 \text{ in}}{1} \times \frac{1 \text{ FT}}{12 \text{ in}} \times \frac{1 \text{ mi}}{5280 \text{ FT}} = \boxed{5.08 \text{ mi}}$$

11. (5 points) Construct a line through P parallel to l .



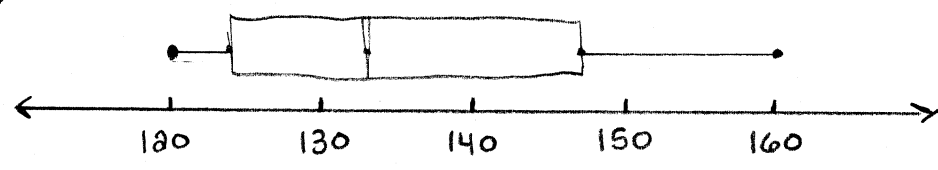
12. (5 points) Construct a boxplot for the following set of data. Assume that there are no outliers.

120 121 121 124 126 128 132
134 140 142 147 150 152 160

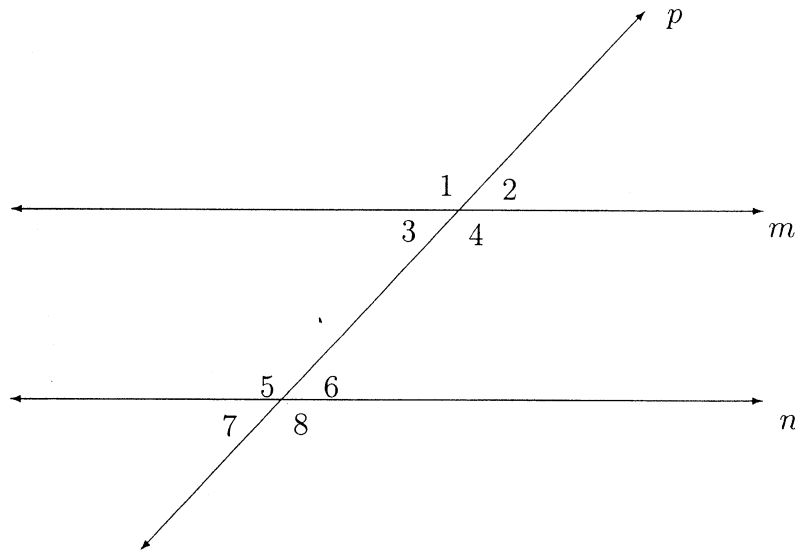
$$M_{\text{EDIA}} = \frac{132 + 134}{2} = 133$$

$$Q_1 = 124$$

$$Q_3 = 147$$



13. (6 points) In the following figure, the parallel lines m and n are being cut by transversal p .



- (a) Name a pair of alternating exterior angles.

$$\angle 1 \text{ \& } \angle 8, \quad \angle 2 \text{ \& } \angle 7$$

- (b) Name a pair of corresponding angles.

$$\angle 3 \text{ \& } \angle 7, \quad \angle 1 \text{ \& } \angle 5, \quad \angle 2 \text{ \& } \angle 6, \quad \angle 4 \text{ \& } \angle 8$$

- (c) Name a pair of alternating interior angles.

$$\angle 3 \text{ \& } \angle 6, \quad \angle 5 \text{ \& } \angle 4$$

- (d) Name a pair of vertical angles.

$$\angle 2 \text{ \& } \angle 3, \quad \angle 1 \text{ \& } \angle 4, \quad \angle 5 \text{ \& } \angle 8, \quad \angle 7 \text{ \& } \angle 6$$

- (e) Name a pair of adjacent angles.

$$\angle 1 \text{ \& } \angle 2, \quad \angle 2 \text{ \& } \angle 4, \quad \angle 4 \text{ \& } \angle 3, \quad \dots$$

- (f) Name a pair of supplementary angles that are not adjacent.

$$\angle 3 \text{ \& } \angle 5, \quad \angle 7 \text{ \& } \angle 1, \quad \dots$$

14. (4 points) Convert $56^{\circ} 14' 32''$ to degrees in decimal form. Round your final answer to the nearest thousandth.

$$56^{\circ} + \frac{14^{\circ}}{60} + \frac{32^{\circ}}{3600} = \boxed{56.242^{\circ}}$$

15. (2 points) Suppose A and B are events with probabilities 0.15 and 0.75, respectively. If $P(A \cup B) = 0.87$, find $P(A \cap B)$.

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$0.87 = 0.15 + 0.75 - P(A \cap B)$$

$$0.87 = 0.90 - P(A \cap B) \Rightarrow$$

$$\boxed{P(A \cap B) = 0.03}$$

16. (2 points) What does CPCTC stand for?

CORRESPONDING PARTS OF CONGRUENT TRIANGLES ARE CONGRUENT.

17. (1 point) A quadrilateral with at least one pair of parallel sides is called a _____.

TRAPEZOID

18. (5 points) Find the mean, median, mode, and standard deviation for the following set of test scores. (You may use your calculator only for the standard deviation.)

~~72~~ ~~68~~ ~~88~~ ~~55~~ ~~92~~
~~72~~ ~~72~~ ~~39~~ ~~92~~ ~~80~~

39 55 68 72 72
 72 80 88 92 92

$$MEAN = \frac{730}{10} = 73$$

$$MEDIAN = \frac{72 + 72}{2} = 72$$

$$MODE = 72$$

$$\sigma = 15.824$$

19. (4 points) For each of the following situations, tell which type of graph would best display the data. Choose from *line plot*, *bar graph*, *histogram*, *line graph*, *stem-and-leaf plot*, or *circle graph*.

- (a) A teacher has just returned the graded tests to a class of twenty-seven students. The test scores are whole numbers that range from 48 to 96. The teacher would like to show the entire list of scores.

STEM-AND-LEAF PLOT

- (b) A botany class spent the day at Morton Arboretum collecting leaves from mature elm trees. The leaves were measured, placed into groups according to lengths, and counted. The class would like to draw a graph to illustrate the numbers of leaves in the different groups.

HISTOGRAM

- (c) A company's annual budget is \$457,000. This money is budgeted into eight different categories. The company's president would like to make a chart showing the employees how the budget is divided into the eight categories.

CIRCLE GRAPH

- (d) Going back to 1990, the student government has obtained the total number of enrolled students for each academic year. The Student Government Association wants to make a chart showing how the enrollment has changed over the years.

LINE GRAPH