

Math 206 - Final Exam
May 14, 2014

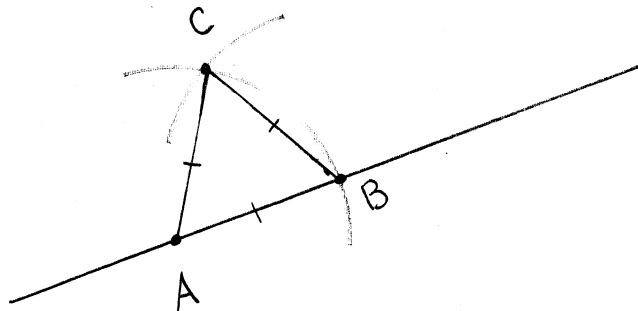
Name key
Score _____

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. (4 points) Halfway through the semester, John lost his notebook and along with it, his first four graded tests. He did remember, however, that his mean score of the four tests was 73. If John scored 96 and 68 on his last two tests, what is the mean score of all his tests? (Assume each test is out of 100 points.)

$$\frac{4(73) + 96 + 68}{6} = \boxed{76}$$

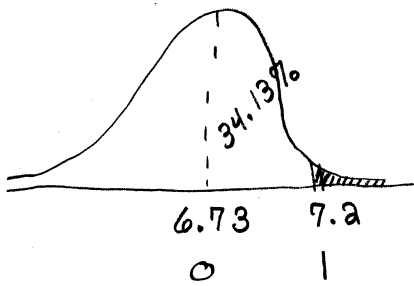
2. (5 points) Construct an equilateral triangle.



3. (6 points) Fill in the blank with the correct word.

- (a) Lines that share a common point are called CONCURRENT lines.
- (b) A curve made up entirely of straight line segments is called a POLYGONAL curve.
- (c) Points that lie on the same line are said to be COLLINEAR.
- (d) A Simple curve is a curve that does not cross itself.
- (e) The angle between two planes is called a DIHEDRAL angle.
- (f) Two coplanar lines that have exactly one point in common are called INTERSECTING lines.

4. (5 points) Biologists studying Australia's Long-Nosed Bandicoot have found that adult males have a mean weight of 6.73 lbs with a standard deviation of 0.47 lbs. Assuming bandicoot weights are normally distributed, about what percent of adult male bandicoots weigh more than 7.2 lbs?



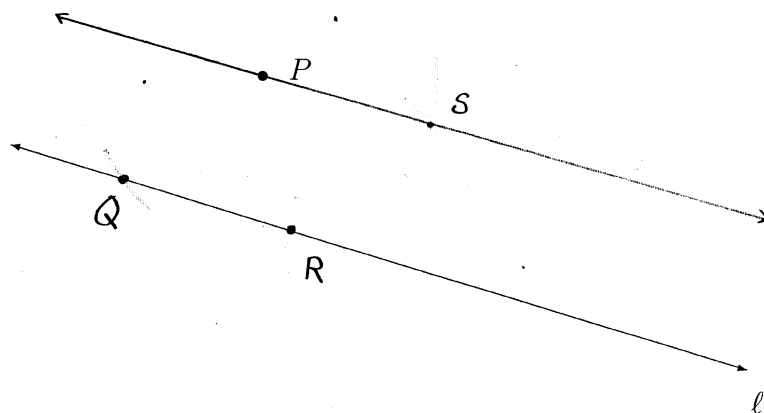
$$z = \frac{7.2 - 6.73}{0.47} = 1$$

Look up $z=1$ to get 0.3413

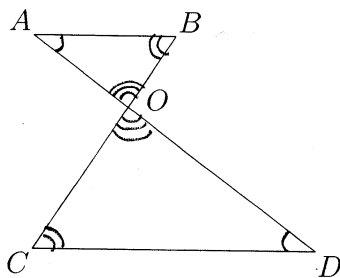
$$50\% - 34.13\%$$

$$= \boxed{15.87\%}$$

5. (5 points) Use only a compass and straightedge to construct a line through P parallel to l .



6. (4 points) Given that $AB \parallel CD$, prove that $\triangle AOB$ is similar to $\triangle DOC$. Carefully explain your reasoning.



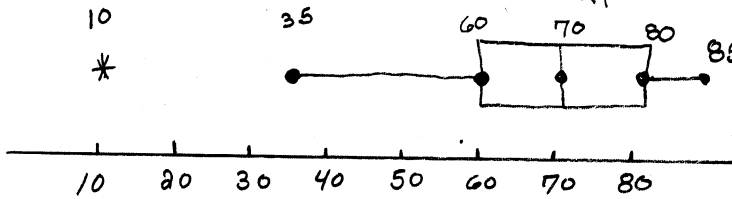
$\angle A$ & $\angle D$ ARE CONGRUENT ALTERNATE INTERIOR \angle 'S
 $\angle B$ & $\angle C$ ARE CONGRUENT ALTERNATE INTERIOR \angle 'S
 THE ANGLES AT O ARE CONGRUENT VERTICAL \angle 'S.

$$\triangle AOB \sim \triangle DOC$$

By AAA.

7. (7 points) Construct a box plot (box-and-whisker plot) for the following set of homework scores. Indicate outliers, if any, with asterisks.

85 80 70 70 80 80 80 85 85 10
 10 35 60 60 70 70 80 80 85 85
 $Q_1 = 60$ $Q_2 = 70$ $Q_3 = 80$



$$IQR = 80 - 60 = 20$$

$$1.5 \times IQR = 30$$

CUTOFFS:

$$60 - 30 = 30$$

$$80 + 30 = 110$$

10 IS THE

ONLY
OUTLIER.

8. (6 points) After collecting data from all of his classes, Horatio assigned probabilities to his grades. His probabilities are given in the following table. Grades are listed according to a 4-point scale: 4-A, 3-B, 2-C, 1-D, 0-F.

Grade	Probability
4	0.11
3	0.47
2	0.26
1	0.12
0	0.04

- (a) What are the odds in favor of Horatio getting an A?

$$\frac{0.11}{1 - 0.11} = \frac{0.11}{0.89} = \boxed{\frac{11}{89}}$$

- (b) Horatio occasionally takes classes with the pass/fail (P/F) grade option. When he does so, his odds in favor of receiving a P are 17:3. What is his probability of receiving a P?

$$\frac{17}{3 + 17} = \boxed{\frac{17}{20}} = 85\%$$

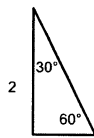
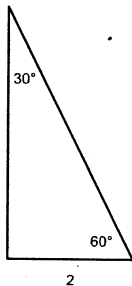
- (c) Compute Horatio's expected number grade.

$$4(0.11) + 3(0.47) + 2(0.26) + 1(0.12) + 0(0.04)$$

$$= \boxed{2.49}$$

9. (3 points) The triangles shown here are clearly not congruent. Why doesn't the AAS congruence property apply?

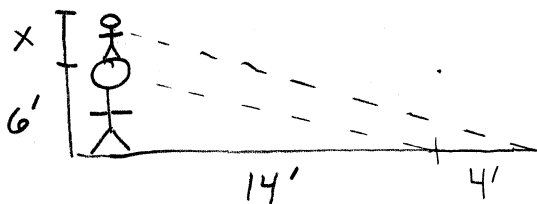
THE ADJACENT SIDES DO NOT CORRESPOND.



IN THE LARGER Δ , THE SIDE OF LENGTH 2 IS ADJACENT TO THE $60^\circ \angle$.

THAT IS NOT THE SAME AS IN THE SMALLER Δ .

10. (5 points) On Tuesday at 4pm, zookeeper Joe, who is exactly 6 ft tall cast 14-ft shadow. A second later, a monkey jumped onto his head and the shadow grew to 18ft. How tall is the monkey? Round your answer to the nearest hundredth of a foot, and then convert that answer to centimeters.



$$\frac{6}{14} = \frac{6+x}{18} \Rightarrow 6(18) = 14(6+x)$$

$$108 = 84 + 14x \Rightarrow x = \frac{24}{14}$$

$$x = \frac{12}{7} \text{ FT}$$

$$\approx 1.71 \text{ FT}$$

$$\boxed{52.1208 \text{ cm}} = \frac{1.71 \text{ FT}}{1} \times \frac{12 \text{ IN}}{1 \text{ FT}} \times \frac{2.54 \text{ cm}}{1 \text{ IN}}$$

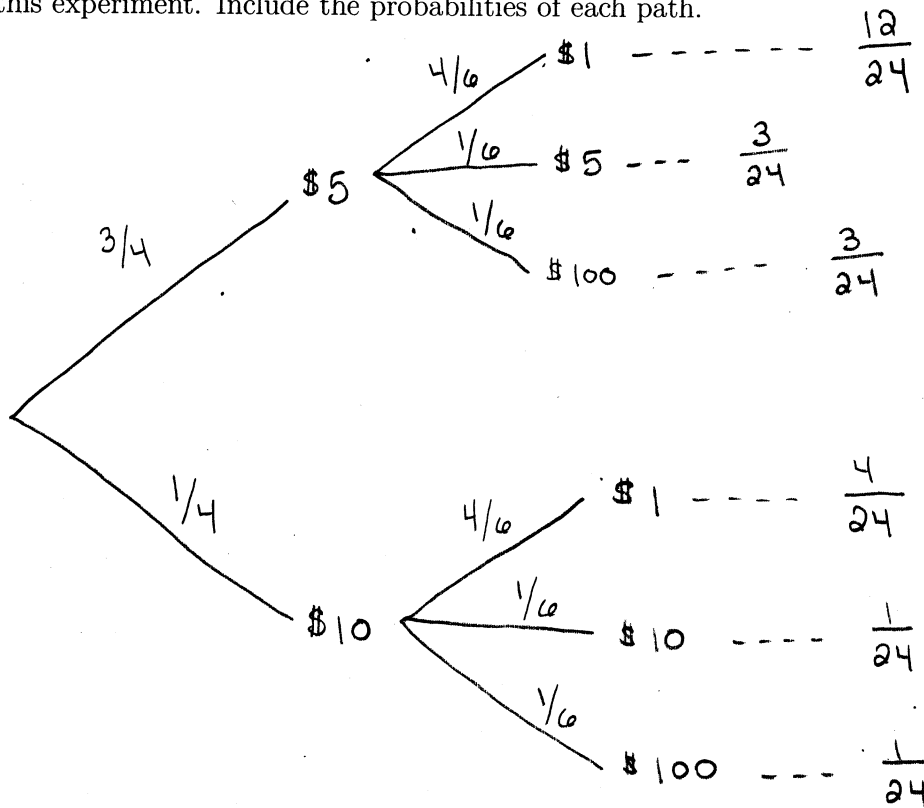
11. (3 points) (a) What is the name of a polygon with 7 sides? (b) What is the measure of each interior angle of a regular 7-sided polygon? (c) What is the measure of each exterior angle of a regular 7-sided polygon?

a) Heptagon

b) $\frac{5(180)}{7} \approx \boxed{128.57^\circ}$

c) $\frac{360}{7} \approx \boxed{51.43^\circ}$

12. (5 points) Bucket #1 contains three \$5 bills and one \$10 bill. Bucket #2 contains four \$1 bills and one \$100 bill. A bill is drawn at random from bucket #1, placed into bucket #2, and then a bill is drawn from bucket #2. Sketch the complete tree diagram for this experiment. Include the probabilities of each path.



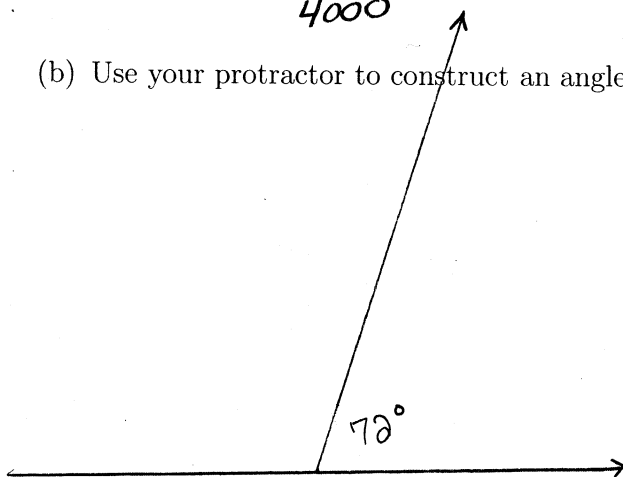
13. (4 points) Stacy makes \$4000 each month, and \$800 of that goes to paying her mortgage.

- (a) If Stacy was to build a circle graph (pie chart) showing her monthly expenditures, what would be the measure of the angle of the portion of the circle graph corresponding to her mortgage?

$$\frac{800}{4000} = 0.20$$

$$(0.20)(360^\circ) = \boxed{72^\circ}$$

- (b) Use your protractor to construct an angle with the measure from part (a).



14. (5 points) An experiment consists of tossing three different coins simultaneously and recording the results (e.g. HHH).

(a) List the sample space.

8 POSSIBLE OUTCOMES

$$\{ HHH, HHT, HTH, HTT, THH, THT, TTH, TTT \}$$

(b) List the event of obtaining a tail on the second coin.

$$\{ HTH, HTT, TTH, TTT \}$$

(c) What is the probability of obtaining a tail on the second coin?

$$\frac{4}{8} = \frac{1}{2}$$

(d) Is the probability you determined above a theoretical probability or an experimental probability?

THEORETICAL

15. (4 points) Suppose A and B are events such that $P(A) = 0.46$, $P(B) = 0.68$, and $P(A \cup B) = 0.92$. Find each of the following.

$$\begin{aligned} \text{(a) } P(A \cap B) &= P(A) + P(B) - P(A \cup B) \\ &= \boxed{0.22} \end{aligned}$$

$$\begin{aligned} \text{(b) } P(\bar{A}) &= 1 - P(A) = \boxed{0.54} \end{aligned}$$

$$\text{(c) } P(A \cup \bar{A}) = \boxed{1}$$

$$\text{(d) } P(\overline{A \cup B}) = 1 - P(A \cup B) = \boxed{0.08}$$

16. (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*. Give a brief explanation to support your answer.

- (a) A company has expenditures that can be grouped into seven broad categories. Company executives would like to make a graph showing how the expenditures are divided among the seven categories.

Circle graph -- BEST FOR SHOWING
PORTIONS OF A
WHOLE

- (b) Emma is writing a report about Greenland. In her report she would like to include a graph that shows the values of the five highest grossing exported products in 2010.

Bar graph --- THE PRODUCTS THEMSELVES
ARE NON-NUMERICAL.

- (c) The National Center for Health Statistics keeps detailed records on the births and deaths of US residents. What type of graph would best display the birth weights of US babies in 2010?

Histogram --- SHOWS FREQUENCIES OF VALUES TAKEN
FROM A CONTINUOUS COLLECTION OF DATA.

- (d) Mr. Smith has been keeping track of the daily price of IBM common stock. He would like to make a graph showing how the prices have changed over the last three weeks.

Line graph -- BEST FOR SHOWING TRENDS
OVER TIME.