

Math 206 - 2nd Final Exam

May 16, 2012

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

(a) List the sample space.

$$\text{Sample Space} = \{ \text{HHH, HHT, HTH, HTT,} \\ \text{THH, THT, TTH, TTT} \}$$

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

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

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

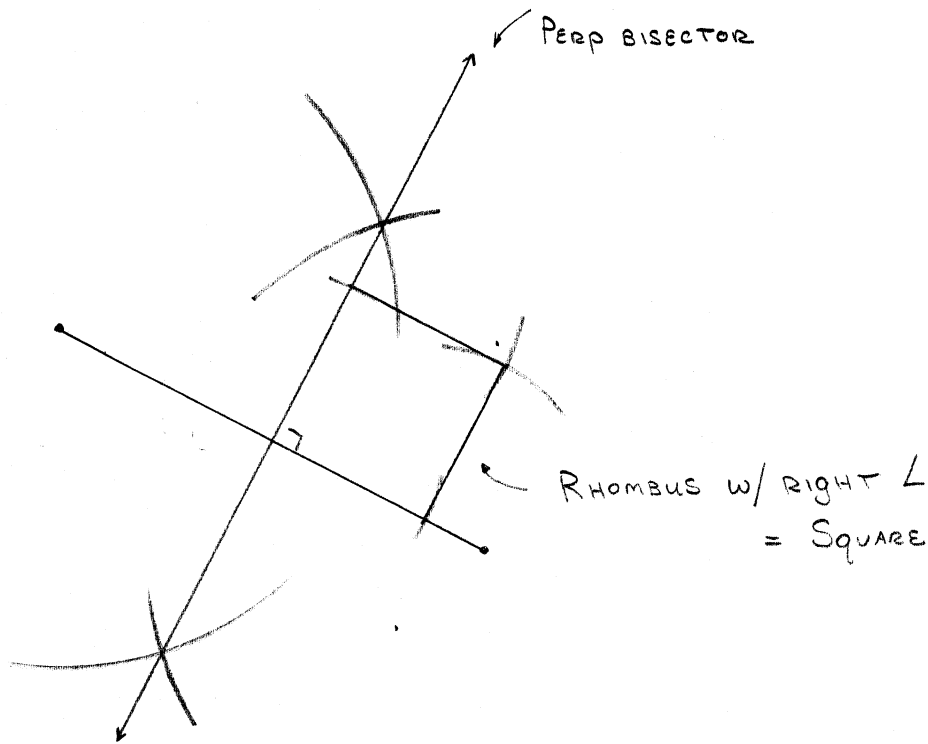
$$\frac{4}{8} = \frac{1}{2}$$

IN FACT, THE PROB OF A
TAIL ON ANY ONE SPECIFIC
COIN IS $\frac{1}{2}$.

2. (5 points) The mean score for 25 of 27 tests is 80. The other two scores are 30 and 35. What is the average of all twenty-seven test scores?

$$\frac{25 \cdot 80 + 30 + 35}{27} \approx 76.48$$

3. (5 points) Use a compass and a straightedge to construct a square.

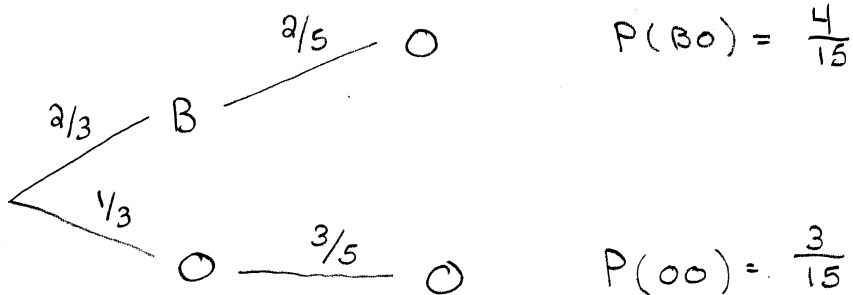


4. (5 points) A letter is selected at random from the first box and placed into the second box. A letter is then selected from the second box.

B O B

M O O N

What are the odds against selecting the letter "O" from the second box?



$$\text{Prob of "O" from 2nd box} = \frac{7}{15}$$

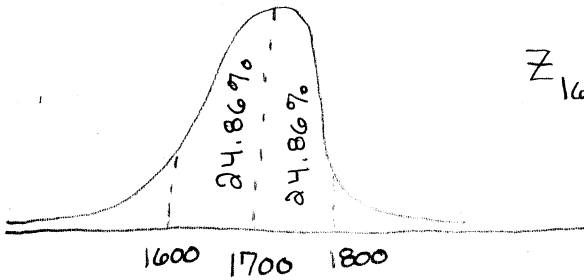
$$\Rightarrow \text{ODDS IN FAVOR} = \frac{7}{8}$$

$$\Rightarrow \text{ODDS AGAINST} = \frac{8}{7}$$

5. (5 points) A certain brand of light bulb has a mean lifetime of 1700 hr with a standard deviation of 150 hr. Assuming the lifetimes are normally distributed, how many in an order of 5000 will have a lifetime of between 1600 hr and 1800 hr?

$$Z_{1800} = \frac{1800 - 1700}{150} = \frac{2}{3} \approx 0.67$$

$$Z_{1600} = \frac{1600 - 1700}{150} = -\frac{2}{3} \approx -0.67$$



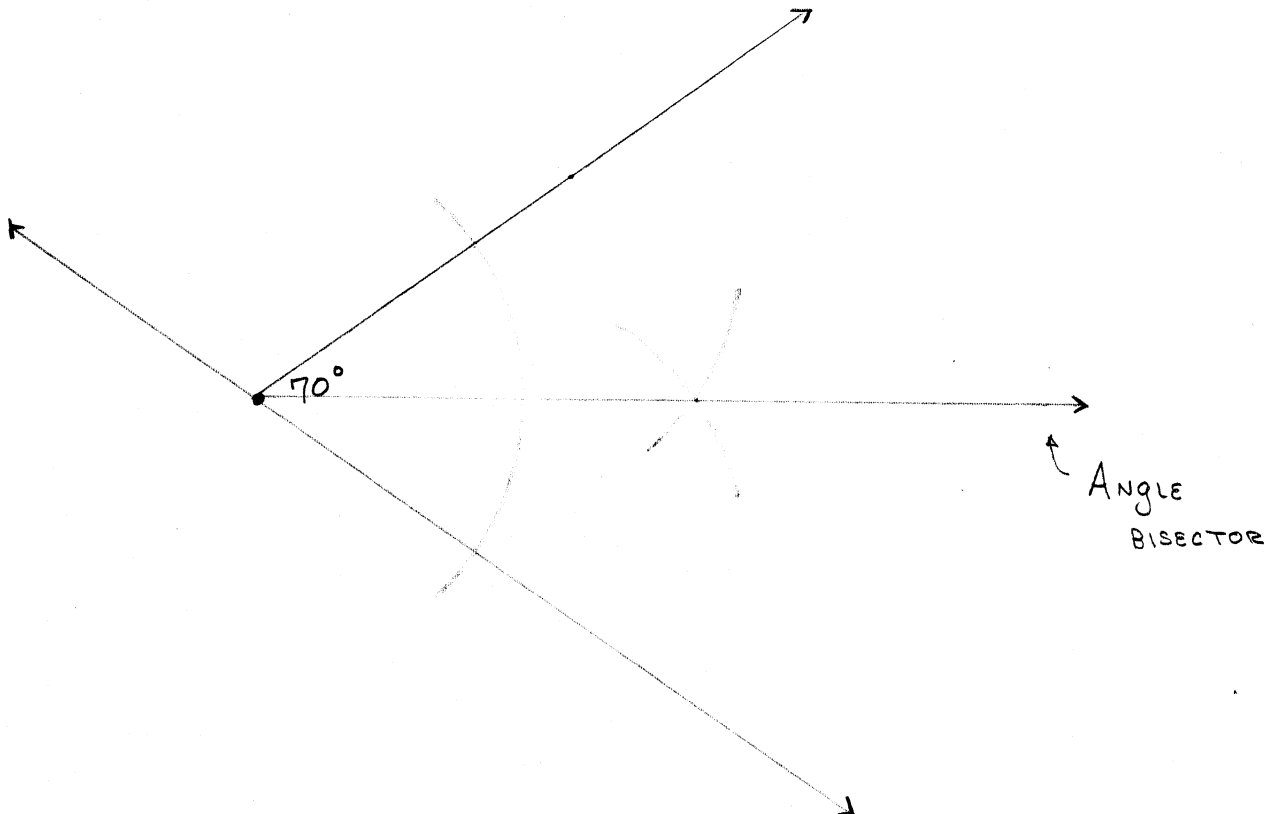
Look up 0.67 to get
24.86%

$$24.86\% + 24.86\% = 49.72\%$$

49.72% of 5000 is

ABOUT 2486

6. (5 points) Use a protractor to sketch an angle that measures 70°. Then using only compass and straightedge, construct the angle bisector.



7. (5 points) A triangle has sides that measure 1.2 m, 85 cm, and 3 ft. Find the perimeter of the triangle in inches.

$$\frac{1.2 \text{ m}}{1} \cdot \frac{100 \text{ cm}}{1 \text{ m}} \cdot \frac{1 \text{ in}}{2.54 \text{ cm}} \approx 47.2441 \text{ in}$$

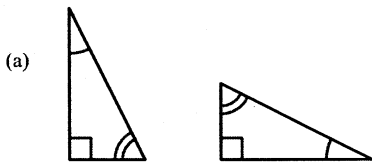
$$\frac{85 \text{ cm}}{1} \cdot \frac{1 \text{ in}}{2.54 \text{ cm}} \approx 33.4646 \text{ in}$$

$$\frac{3 \text{ FT}}{1} \cdot \frac{12 \text{ in}}{1 \text{ FT}} = 36 \text{ in}$$

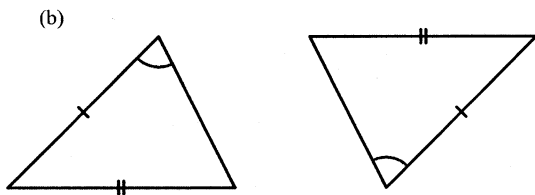
PERIMETER

$$\approx 116.7087 \text{ in}$$

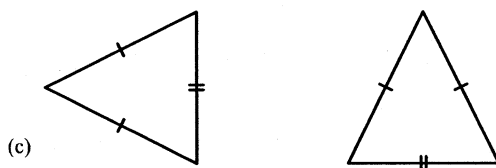
8. (5 points) For each of the following pairs of triangles, determine whether the given conditions are sufficient to show the triangles are congruent. If the triangles are congruent, tell which congruence property can be used to verify this fact.



No, AAA is NOT A CONGRUENCE PROPERTY



No, SSA IS NOT A CONGRUENCE PROPERTY



Yes, SSS IS A CONGRUENCE PROPERTY.

9. (5 points) A game consists of rolling a regular die, with prizes awarded as follows:

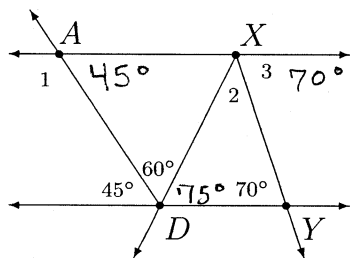
- Roll a 1 and win \$5 Prob is $\frac{1}{6}$
- Roll a 2, 4, or 6 and win \$2 Prob is $\frac{3}{6}$
- Roll a 3 or 5 and win \$1 Prob is $\frac{2}{6}$

If the game costs \$3 to play, how much should one expect to gain or lose on average?

$$\begin{aligned} \text{EXPECTED VALUE} &= \frac{1}{6}(\$5) + \frac{3}{6}(\$2) + \frac{2}{6}(\$1) \\ &= \$ \frac{5+6+2}{6} = \$ \frac{13}{6} \approx \$2.17 \end{aligned}$$

$$\text{LOSE } \$3 - \$2.17 = \$0.83 \text{ per game ON AVERAGE}$$

10. (5 points) Given the figure shown below with $\overleftrightarrow{AX} \parallel \overleftrightarrow{DY}$, find each of the following:



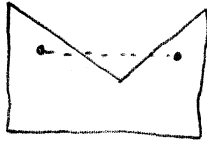
(a) $m(\angle 1) = 180^\circ - 45^\circ = \boxed{135^\circ}$

(b) $m(\angle 2) = 180^\circ - 75^\circ - 70^\circ = \boxed{35^\circ}$

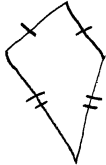
(c) $m(\angle 3) = \boxed{70^\circ}$

11. (6 points) Sketch each of the following or explain why it is not possible.

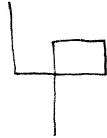
(a) A concave pentagon



(b) A kite that is not a rhombus



(c) A polygonal curve that is neither simple nor closed



(d) A scalene, isosceles triangle

NOT POSSIBLE, SCALENE HAS NO SIDES CONGRUENT
AND ISOSCELES HAS AT LEAST TWO SIDES
CONGRUENT

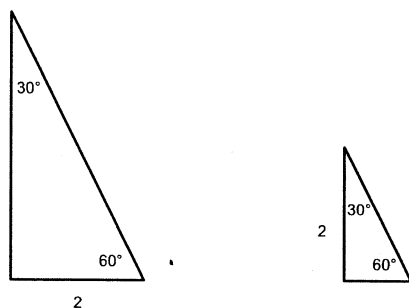
(e) A parallelogram with exactly one right angle

NOT POSSIBLE, IF ONE ANGLE IS A RIGHT
ANGLE, THEN ALL FOUR INTERIOR ANGLES
ARE RIGHT ANGLES

(f) An equilateral triangle that is not acute

NOT POSSIBLE, THE INTERIOR ANGLES
OF AN EQUILATERAL TRIANGLE ARE ALL
 60° -ANGLES (ACUTE!).

12. (3 points) The triangles shown here are clearly not congruent. Why doesn't the AAS congruence property apply?



THE SIDES OF LENGTH 2 ARE NOT CORRESPONDING SIDES. IF THE SIDE OF LENGTH 2 WAS ADJACENT TO THE 30° IN BOTH TRIANGLES, THE TRIANGLES WOULD HAVE TO BE CONGRUENT.

13. (3 points) Edgar was interested in answering the following question:

If a PSC student is chosen at random, what is the probability that the student is a female?

To answer his question, Edgar counted 50 students as they passed through the doors, and 31 were females.

- (a) Edgar assigned the probability a value of $31/50$. Is this a theoretical or experimental probability?

EXPERIMENTAL PROB --- HE'S ACTUALLY DOING AN EXPERIMENT AND ASSIGNING A PROBABILITY BASED ON OBSERVATION.

- (b) What would Edgar need to do to assign the other type of probability?

EDGAR WOULD NEED TO KNOW THE TOTAL NUMBERS OF STUDENTS AND FEMALE STUDENTS.

$$P_{\text{ROB}} = \frac{\text{TOTAL \# OF FEMALE STUDENTS}}{\text{TOTAL \# OF STUDENTS}}$$

14. (5 points) Chester scored 54 on a test with mean 45.39 and standard deviation 4.1. Alice scored 25 on a test with mean 19.34 and standard deviation 2.75. Compute the z-scores and determine who scored better.

CHESTER: $z = \frac{54 - 45.39}{4.1} = 2.1$ ← CHESTER'S SCORE IS
2.1 STANDARD DEVS
ABOVE MEAN

ALICE: $z = \frac{25 - 19.34}{2.75} \approx 2.06$ ← ALICE'S SCORE IS
2.06 STANDARD DEVS.
ABOVE MEAN

CHESTER SCORE IS SLIGHTLY
BETTER

15. (3 points) The twenty children in Sam's class received the following scores on their math quizzes:

10 7 7 3 9 7 8 7 10 9
5 7 3 10 9 7 5 8 6 7

On the sheet of graph paper (attached), sketch the dot plot for the class data.

SEE ATTACHED SHEET.

16. (5 points) Fill in the blank with an appropriate word or phrase.

(a) The standard deviation is a measure of SPREAD.

(b) Points that line on the same line are said to be COLLINEAR

(c) The arithmetic mean is a measure of CENTER

(d) IQR is an abbreviation for INTERQUARTILE RANGE

(e) A finite subset of a line that lies between two points is called a LINE SEGMENT

SAM'S CLASS SCORES

