

Math 206 - Final Exam

May 16, 2018

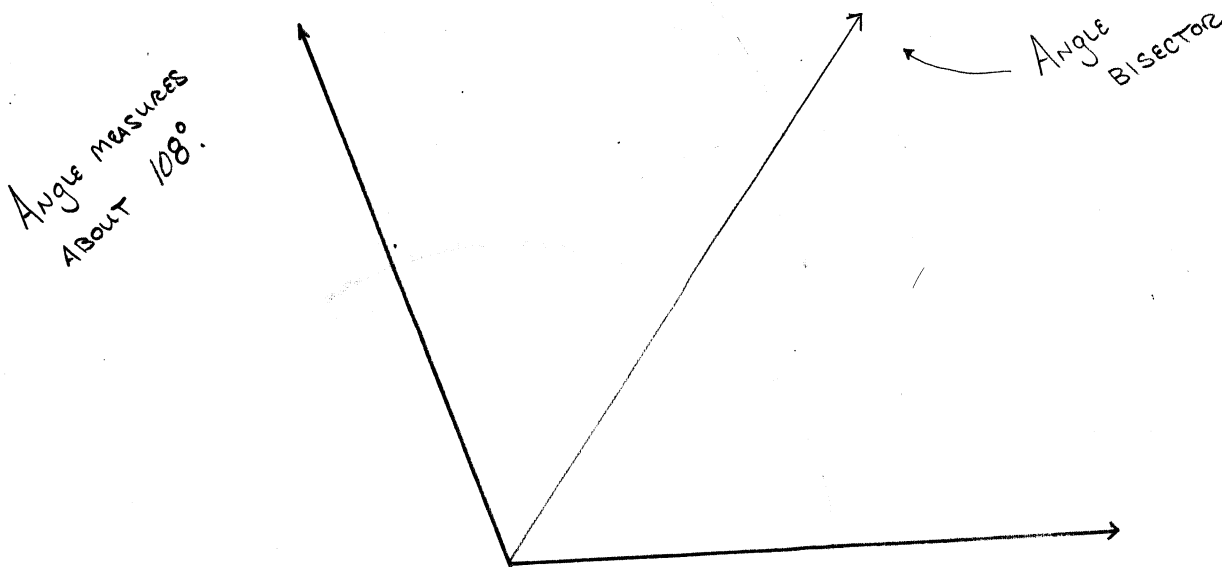
Name key

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.

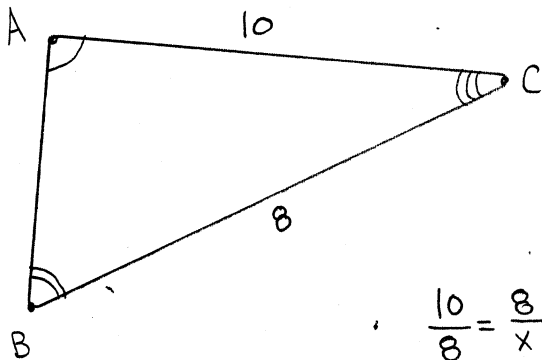
1. (6 points)

- (a) Use a straightedge to sketch an obtuse angle.
- (b) Use your protractor to measure the angle.
- (c) Then bisect the angle using only compass and straightedge. Show all steps.



2. (4 points) Suppose $\triangle ABC \sim \triangle DBE$. Find $m(EB)$ if $m(AC) = 10$, $m(DE) = 8$, and $m(CB) = 8$.

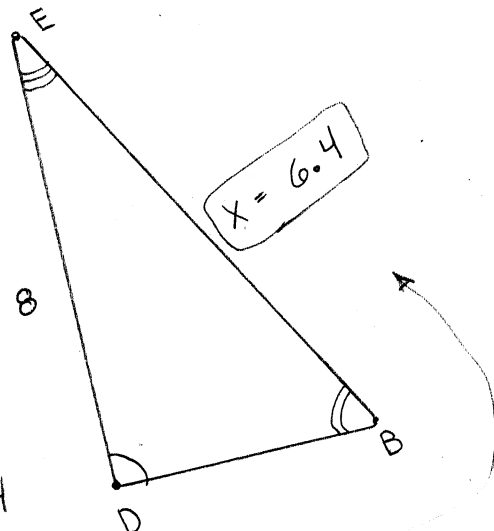
NOT DRAWN TO SCALE.



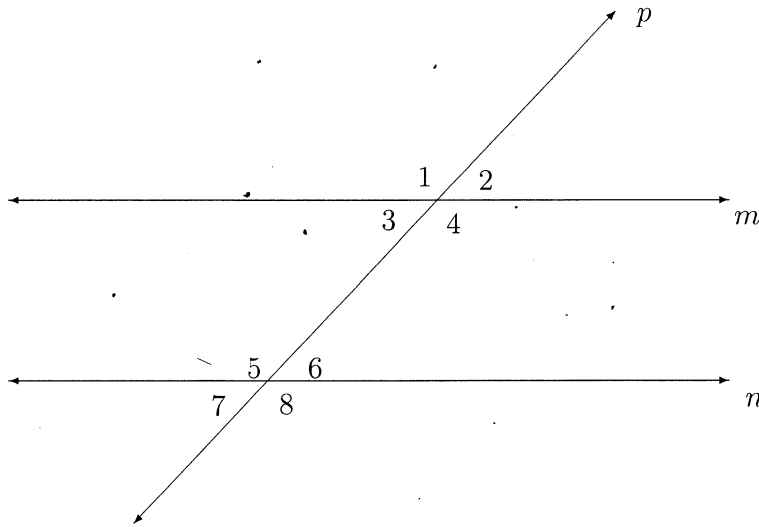
$$\frac{10}{8} = \frac{8}{x}$$

$$10x = 64$$

$$x = 6.4$$



3. (8 points) In the following figure, the parallel lines m and n are being cut by transversal p .



- (a) Name a pair of corresponding angles.

$\angle 1$ AND $\angle 5$ ARE CORRESPONDING.

- (b) Find $m(\angle 1)$ if $m(\angle 7) = 45^\circ$.

$$m(\angle 7) = 45^\circ \Rightarrow m(\angle 5) = 135^\circ \Rightarrow m(\angle 1) = 135^\circ$$

- (c) Find $m(\angle 5)$ if $m(\angle 3) = 36^\circ$.

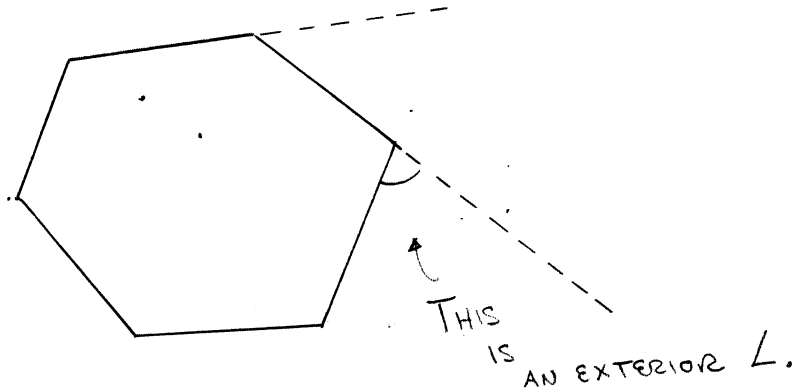
$$m(\angle 3) = 36^\circ \Rightarrow m(\angle 4) = 144^\circ \Rightarrow m(\angle 5) = 144^\circ$$

- (d) Name a pair of alternate exterior angles.

$\angle 1$ AND $\angle 8$ ARE ALT EXTERIOR \angle 'S.

4. (6 points)

(a) Use a straightedge to sketch a convex hexagon.



(b) What is the sum of the measures of the interior angles of your convex hexagon?

$$(6-2) \times 180^\circ = 4 \times 180^\circ = \boxed{720^\circ}$$

(c) Refer to your sketch above. On your sketch, identify one of the exterior angles.

SEE ABOVE.

(d) What is the sum of the measures of the exterior angles?

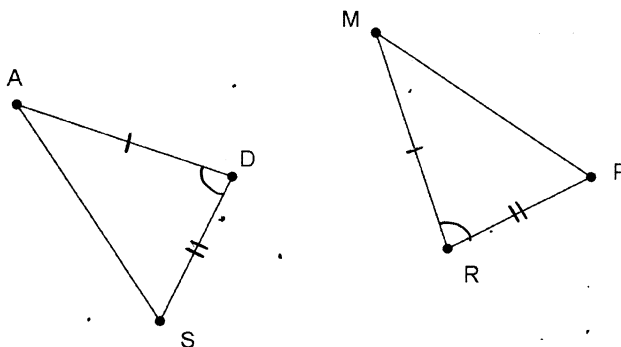
$$\boxed{360^\circ}$$

↑ FOR ALL CONVEX POLYGONS.

(e) If your hexagon was a regular hexagon, what would be the measure of each interior angle?

$$\frac{720^\circ}{6} = \boxed{120^\circ}$$

5. (6 points) In the figure below, suppose $\overline{AD} \cong \overline{MR}$, $\overline{SD} \cong \overline{RP}$, and $\angle D \cong \angle R$.



(a) What congruence property justifies that the triangles are congruent?

SAS

(b) Write a correctly ordered congruence relationship.

$$\triangle ADS \cong \triangle MRP$$

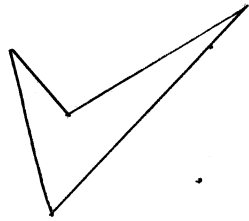
(c) Rather than $\angle D$ being congruent to $\angle R$, suppose you knew that $\angle S \cong \angle P$. Would this new fact change what you think about the congruence of the triangles? Explain.

Yes, ASS IS NOT A CONGRUENCE PROPERTY.

WE COULD NOT BE SURE THAT THE Δ 'S ARE CONGRUENT.

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

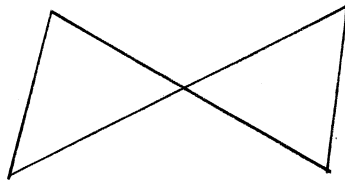
(a) A concave quadrilateral



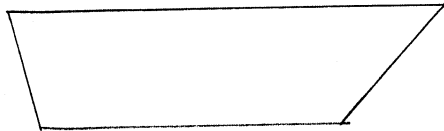
(b) A rhombus that is not a kite

Not possible. Every rhombus has
two pairs of adjacent congruent sides
(i.e., is a kite).

(c) A polygonal curve that is closed but not simple



(d) A trapezoid that is not a parallelogram



2 opposite sides parallel,
2 opposite sides not parallel

(e) A parallelogram with exactly one right angle

Not possible. If a parallelogram has
one right \angle , then it has all four!

(f) An equilateral triangle that is not isosceles

Not possible. An equilateral has 3 congruent
sides, therefore it has 2
congruent sides.

7. (2 points) The mean weight of seven linemen on a team is 235 lb. The mean weight of the four backfield members is 190 lb. What is the mean weight of the entire 11-person team?

$$\frac{7(235) + 4(190)}{11} = \frac{2405}{11} = 218.\overline{63}$$

$$\approx 218.6 \text{ lbs}$$

8. (10 points) The upper leg lengths, in centimeters, of 20 adult females are shown below (in numerical order).

27.2 31.1 33.2 36.0 36.3 38.1 38.2 38.2 38.7 39.0
39.2 39.7 39.9 40.2 40.3 41.3 41.6 41.6 43.8 48.5

Determine the quartiles, the interquartile range, and the boundary values for outliers. Then sketch the boxplot. (Do all work by hand, but you may check your work on your calculator.)

$$Q_1 = \frac{36.3 + 38.1}{2} = 37.2$$

$$M_{ED} = \frac{39 + 39.2}{2} = 39.1$$

$$Q_3 = \frac{40.3 + 41.3}{2} = 40.8$$

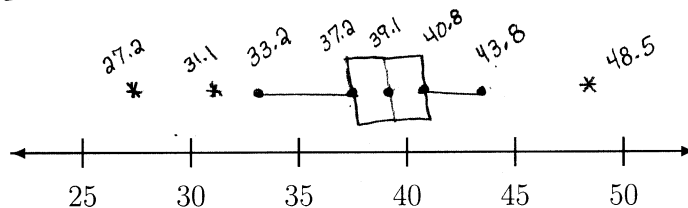
$$IQR = 40.8 - 37.2 = 3.6$$

OUTLIER BOUNDARIES:

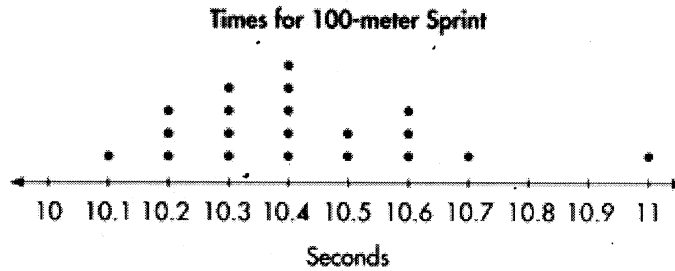
$$37.2 - 1.5(3.6) = 31.8$$

$$40.8 + 1.5(3.6) = 46.2$$

27.2, 31.1, & 48.5
ARE OUTLIERS



9. (6 points) The graphic shown below gives the times, in seconds, for the 100-meter sprints of a number of runners.



- (a) What is the name of this type of graphical display?

Dot Plot

- (b) How many data values are shown in the graph?

20

- (c) What is the median time for running the 100-meter sprint? Give units with your answer.

$$\frac{9^{\text{TH}} + 10^{\text{TH}}}{2} = \frac{10.4 + 10.4}{2} = 10.4 \text{ sec}$$

- (d) What is the mean time for running the 100-meter sprint? Give units with your answer.

$$\frac{10.1 + 3(10.2) + 4(10.3) + 5(10.4) + 2(10.5) + 3(10.6) + 10.7 + 11}{20} = \frac{208.4}{20} = 10.42 \text{ sec}$$

- (e) What is the mode? Give units with your answer.

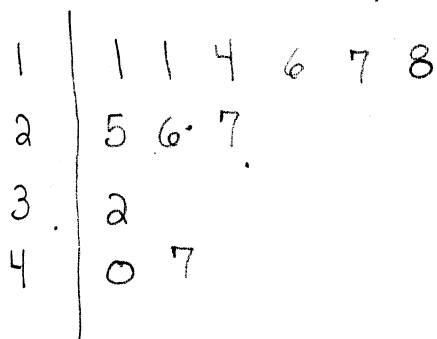
10.4 sec

- (f) Compute the range. Give units with your answer.

$$11 - 10.1 = 0.9 \text{ sec}$$

10. (2 points) Construct a stem-and-leaf plot for the following collection of numbers. Be sure to include a key.

~~1.1, 4.7, 1.8, 1.4, 3.2, 1.1, 4.0, 2.7, 2.5, 1.6, 2.6, 1.7~~



3 | 2 means 3.2

11. (5 points) A jar contains 8 blue marbles, 4 red marbles, and 2 green marbles. A marble is selected at random.

- (a) What is the sample space for this experiment?

{ blue, red, green }

- (b) Is your sample space a uniform sample space? Explain.

No, THE OUTCOMES ARE NOT EQUALLY LIKELY
BECAUSE THERE ARE DIFFERENT
NUMBERS OF THE COLORS.

- (c) What is the probability that the marble is not red?

$$\frac{8+2}{14} = 1 - \frac{4}{14} = \frac{10}{14}$$

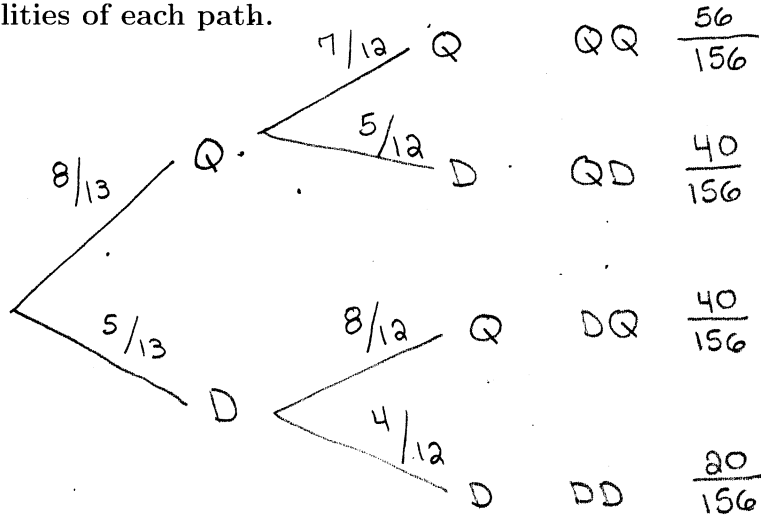
- (d) Is your probability above theoretical or experimental?

- (e) Instead of selecting one marble, suppose four marbles are selected (without replacement). What is the probability that at least two have the same color? Explain.

Only 3 colors \Rightarrow 100%

12. (6 points) A jar contains 8 quarters and 5 dimes. Two coins are selected at random, without replacement.

(a) Sketch the complete tree diagram for this experiment. **Include the probabilities of each path.**



(b) What is the probability of selecting 35 cents?

QD
&
DQ

$$\frac{40 + 40}{156} = \frac{80}{156}$$

(c) What is the probability of selecting more than 35 cents?

QQ

$$\frac{56}{156}$$

(d) What is the probability of the second coin being a dime given that the first coin is a dime?

$$\frac{4}{12}$$

- 27 coins
13. (3 points) Suppose five quarters, six dimes, four nickels, and twelve pennies are in a jar. One coin is selected at random. What is the expected amount of money drawn from the jar?

$$25\left(\frac{5}{27}\right) + 10\left(\frac{6}{27}\right) + 5\left(\frac{4}{27}\right) + 1\left(\frac{12}{27}\right)$$

$$= \frac{125 + 60 + 20 + 12}{27} = \frac{217}{27} = 8.\overline{037}$$

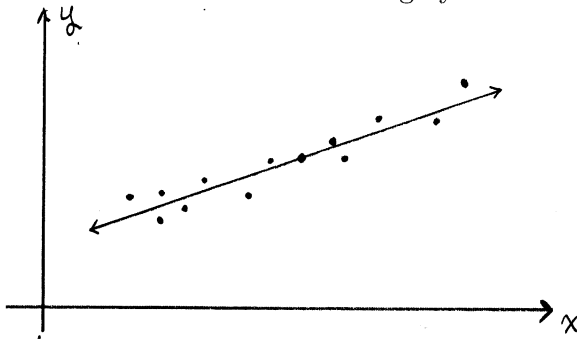
$\approx 8.04¢$

14. (2 points) If the probability of an event is $\frac{88}{93}$, what are the odds against the event?

Odds in favor are $\frac{88}{5}$

\Rightarrow Odds against are $\frac{5}{88}$

15. (2 points) Sketch a scatterplot showing a collection of data with a strong (but not perfect) positive linear association. Also roughly sketch the trend line.



16. (1 point) Steve is sure that his car will break down somewhere along his 54-mile commute. If it breaks down at a random location, what is the probability that it breaks down in the first 2 miles or the last 2 miles of his commute?

$$\frac{2+2}{54} = \frac{4}{54}$$