

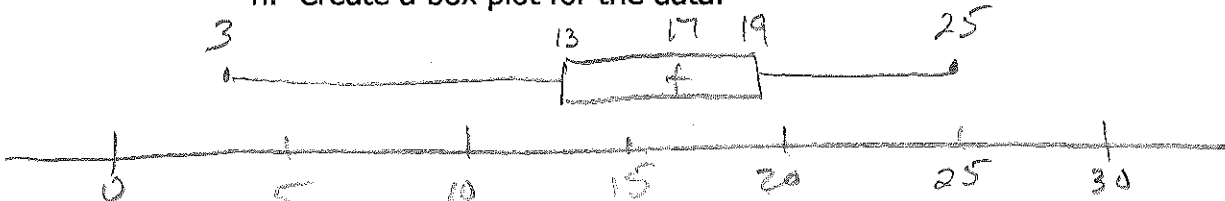
Algebra 2, Midterm Review HW

Name _____
 Hour _____ Date _____

1. Use the following data to answer the questions:

3 10 12 13 15 16 16 17
 18 19 19 19 20 20 25

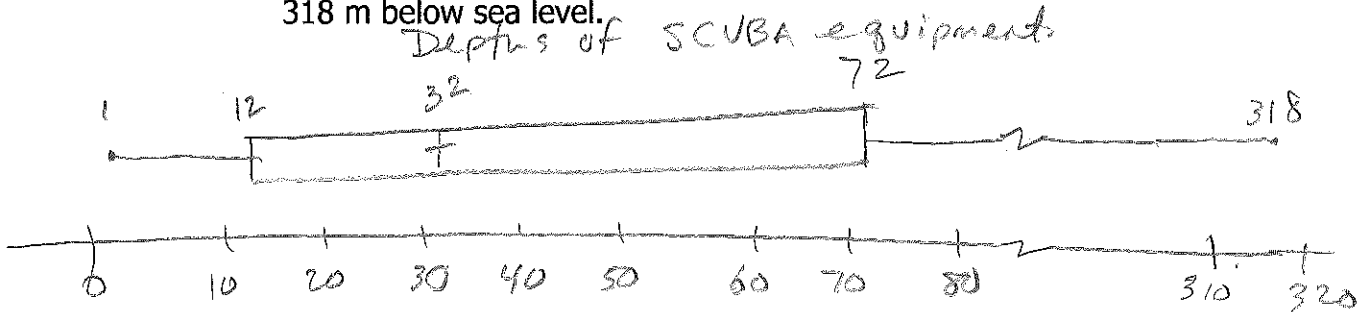
- a. What is the mean of the data set? $16.1\bar{3}$
- b. What is the median of the data set? 17
- c. What is the mode of the data set? 19
- d. What is the lower/1st quartile? 13
- e. What is the upper/3rd quartile? 19
- f. What is the standard deviation? 5.004
- g. What is the range? $25 - 3 = 22$
- h. Create a box plot for the data.



2. The following data has been found when studying the depths of different types of SCUBA equipment:

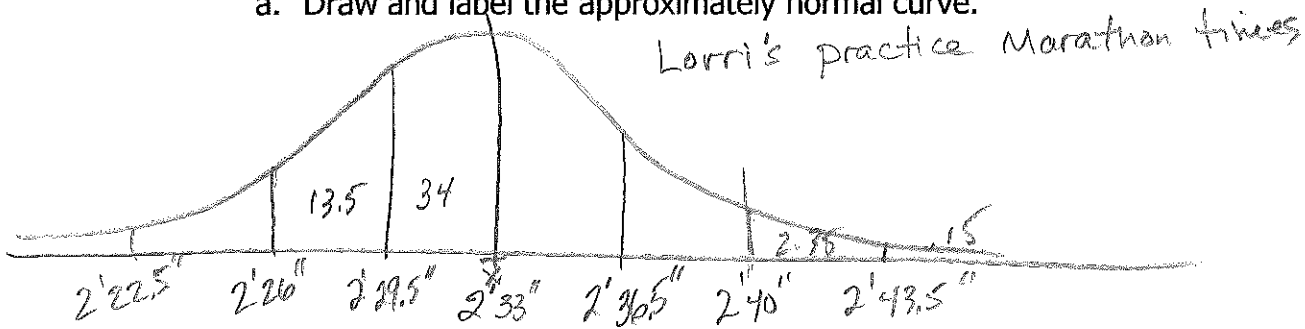
Lower Quartile: 12 m below sea level
 Median: 32 m below sea level
 Mean: 38 m below sea level
 Mode: 30 m below sea level
 Upper Quartile: 72 m below sea level

- a. Based on the information, explain why you think the data will have a certain shape. *Skewed Right b/c the \bar{x} is larger than Median*
- b. Construct a box plot if the minimum and maximum depths are 1 m and 318 m below sea level.



3. Lorri is training for a marathon. The times of her practice runs form a normal distribution with $\bar{x} = 2$ hr 33 min and $\sigma = 3.5$ min.

a. Draw and label the approximately normal curve.



b. About 68% of her times fall within what times?

$$2:29.5'' - 2:36.5''$$

c. What percent of her times are between 2 hr 26 min and 2 hr 33 min?

$$47.5\%$$

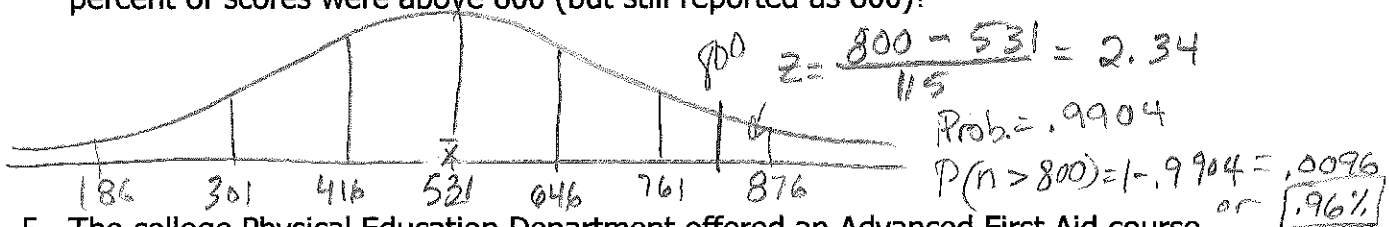
d. In order to qualify for a certain marathon, a runner must have an official time of 2:40 or less in a previous race. Once Lorri chooses a qualifying race, what is the probability that she will qualify for the marathon?

$$100 - 2.5 = 97.5\%$$

e. Lorri ran a marathon in 2:50. She thinks this is not a good representation of her times. Would you agree? Why/why not?

yes, because it is an outlier
(+2σ)

4. It is possible to score higher than 800 on either part of the SAT, but scores above 800 are reported as 800. In 1999, the scores on the math part of the SAT followed a normal distribution with mean 531 and standard deviation 115. What percent of scores were above 800 (but still reported as 800)?



5. The college Physical Education Department offered an Advanced First Aid course last semester. The scores on the comprehensive final exam were normally distributed, and the z-scores for some of the students are shown below:

Robert 1.10	Jan 1.70	Susan -2.00
Joel 0.00	John -0.80	Linda 1.60

a. Which of these students scored above the mean?

Robert, Jan, Linda

b. Which of these students scored at the mean?

Joel

c. If the mean score was $\bar{x} = 150$ with standard deviation $\sigma = 20$, what was the final exam score for each student?

Robert = 172	Jan = 184	Susan = 110	Joel = 150
$\frac{x - 150}{20} = 1.10$			
	John = 134	Linda = 182	

6. The box plot below shows the ages of actresses who have received an Oscar award for their performances.

a. At what percentile is an actress who is 28 years old?

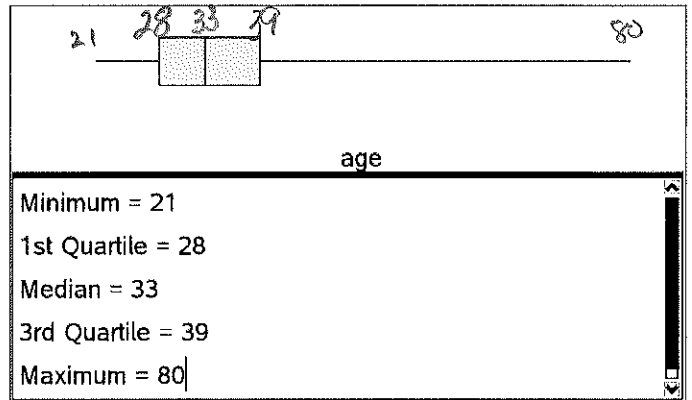
25th

b. If an actress is at the 50th percentile ranking, what is her age?

33 years

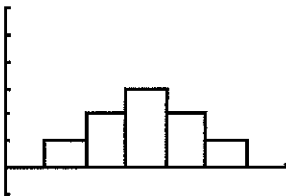
c. At what age would 75% of the actress be at that age or below?

39 years

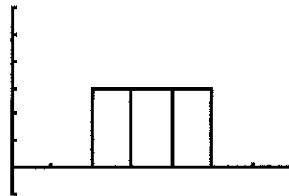


7. Order the following from smallest to largest standard deviation:

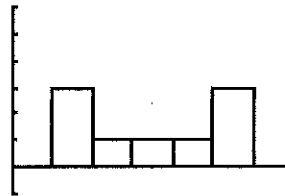
Data Set A



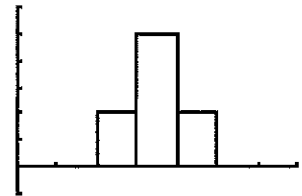
Data Set B



Data Set C



Data Set D



(Please write the letters in order from smallest to largest)

D, B, A, C

8. The following data has been found when studying teenager text messages sent/received per day:

Minimum: 0

Lower Quartile: 305

Median: 386

Mean: 365

Mode: 409

Upper Quartile: 495

Maximum: 600

Can you conclude that there will be outliers? Show your reasoning.

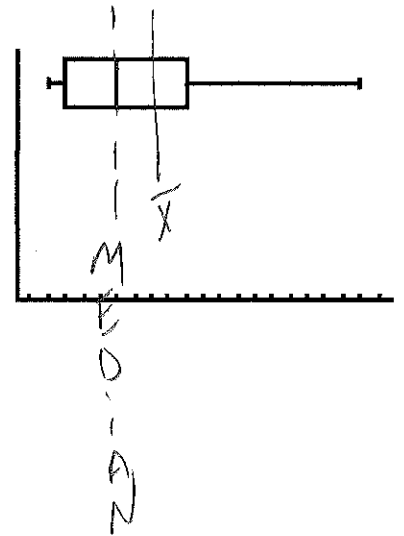
$$495 - 305 = 190$$

$$190 \cdot 1.5 = 285$$

$$305 - 285 = 20 \quad | \quad 495 + 285 = 780$$

0 is an outlier its below 20

9. Use the following box plot to answer the questions below:
- Label the mean and median on the graph.
 - What is the shape of the graph?



Skewed Right

10. Find the excluded value(s) for the function $y = \frac{4x}{x^2 - 5x + 6}$

$$\frac{4x}{(x-3)(x-2)} \rightarrow \text{So } x \neq 3, 2$$

11. Simplify $\frac{3x^2 - 13x - 10}{x^2 + x - 30} = \frac{(3x+2)(x-5)}{(x+6)(x-5)} = \frac{3x+2}{x+6} \quad x \neq -6, 5$

12. Simplify $\frac{x^2 + 3x}{x^2 - 3x + 2} \cdot \frac{x^2 - x - 2}{x^2 + 4x + 3}$

$$\frac{x(x+3)}{(x-2)(x-1)} \cdot \frac{(x-2)(x+1)}{(x+3)(x+1)} = \frac{x}{x-1} \quad x \neq 2, 1, -3, -1$$

13. Simplify $\frac{18x^2y^3}{7xy^2} \div \frac{12x^4}{14xy}$

$$\frac{18x^2y^3}{7xy^2} \cdot \frac{14xy}{12x^4} = \frac{3 \cdot 18 \cdot 14 \cdot x^2 \cdot y^3 \cdot x \cdot y}{7 \cdot 12 \cdot x^5 \cdot y^2} = \frac{3y^2}{x^2} \quad \begin{matrix} x \neq 0 \\ y \neq 0 \end{matrix}$$

Evaluate the expression without a graphing calculator.

14. $\frac{1}{81^{-3/4}}$

$81^{3/4} = \sqrt[4]{81^3}$
 $3^3 = 27$

15. $(\sqrt{81})^3$

$9^3 = 9 \cdot 9 \cdot 9 = 729$
 $\frac{81}{9} = 729$

Simplify each expression.

16. $\frac{\sqrt[3]{125} \cdot \sqrt[3]{8}}{5 \cdot 2} = 10$

17. $\frac{x^{2/5} y^4}{x y^{-1/3}}$ $\frac{x^{2/5} y^{3 \cdot 3/3} y^{1/3}}{x^{1/5} y^{-1/3}} = \frac{y^{10/3}}{x^{4/5}}$

Simplify each expression.

18. $12^{1/8} \cdot 12^{5/6}$
 $\frac{1}{8} + \frac{5}{6} = \frac{3}{24} + \frac{20}{24}$

$12 = 12$
 $12^{23/24}$

19. $\frac{\sqrt[4]{10}}{\sqrt[4]{125}}$ $\frac{\sqrt[4]{10}}{\sqrt[4]{125}} = \frac{\sqrt[4]{10}}{\sqrt[4]{5^3}}$

$\frac{\sqrt[4]{10} \cdot \sqrt[4]{5}}{\sqrt[4]{125} \cdot \sqrt[4]{5}} = \frac{\sqrt[4]{50}}{5}$
 $5 \cdot 5 \cdot 5$

20. $10^4 \sqrt{5x^7} - x^4 \sqrt{80x^3}$
 $10 \times \sqrt{5x^3} - 2 \times \sqrt{5x^3}$
 $8 \times \sqrt{5x^3}$
 $\frac{80}{8} = 10$
 $\frac{20}{2} = 10$

21. $(x^2 y^{1/3})^{2/5}$
 $x^{4/5} y^{2/15}$

22. Let $f(x) = 5x^{1/3}$ and $g(x) = -11x^{1/3}$. Find the following.

a. $f(x) + g(x)$
 $5x^{1/3} + -11x^{1/3}$
 $-6x^{1/3}$

b. $f(x) - g(x)$
 $5x^{1/3} + 11x^{1/3}$
 $16x^{1/3}$

23. Let $f(x) = 8x$ and $g(x) = 2x^{5/6}$. Find the following.

a. $f(x) \cdot g(x)$

$$8x^{6/6} \cdot 2x^{5/6}$$

$$\boxed{16x^{11/6}}$$

b. $\frac{f(x)}{g(x)}$

$$\frac{8x^{6/6}}{2x^{5/6}} = \boxed{4x^{1/6}}$$

24. Let $f(x) = x - 7$, $g(x) = x^2 - 4x - 21$, and $h(x) = x + 3$. Find the following.

a. $f(x) \cdot g(x)$

$$(x - 7)(x^2 - 4x - 21)$$

	x^2	$-4x$	-21
x	x^3	$-4x^2$	$-21x$
-7	$-7x^2$	$28x$	147

$$\boxed{x^3 - 11x^2 + 7x + 147}$$

b. $\frac{f(x)}{g(x)}$

$$\frac{x - 7}{x^2 - 4x - 21} = \frac{(x - 7)}{(x - 7)(x + 3)}$$

$$\boxed{\frac{1}{x + 3} \quad x \neq 7, -3}$$

25. Let $f(x) = 6x^{-2}$ and $g(x) = 4x + 5$. Find the following.

a. $f(g(x))$

$$\frac{6}{(4x + 5)^2}$$

or

$$\frac{6}{16x^2 + 40x + 25}$$

b. $[g \circ f](x)$

$$4\left(\frac{6}{x^2}\right) + 5$$

$$\boxed{\frac{24}{x^2} + 5}$$

26. Find $f^{-1}(x)$ for each of the following functions.

a. $f(x) = \frac{x - 5}{3}$

$$3 \cdot x = \frac{y - 5}{3}$$

$$3x = \frac{y - 5}{3}$$

$$3x + 5 = y$$

$$\boxed{f^{-1}(x) = 3x + 5}$$

b. $f(x) = x^2 + 6x - 12$

skip

Solve and then check your solution.

$$27. \sqrt{x} = 6^2 \quad \sqrt{36} = 6$$

$$\boxed{x = 36} \quad 6 = 6 \checkmark$$

$$28. \sqrt{x} + 3 = 7$$

$$\begin{array}{r} -3 \quad -3 \\ \sqrt{x} = 4 \end{array}$$

$$\boxed{x = 16}$$

$$\sqrt{16} + 3 = 7$$

$$4 + 3 = 7$$

$$7 = 7 \checkmark$$

$$29. 4\sqrt[3]{x-6} = \frac{6}{4}$$

$$4\sqrt[3]{\frac{25 \cdot 48}{8}} = 6$$

$$4\sqrt[3]{\frac{27}{8}}$$

$$\left(\sqrt[3]{x-6}\right)^3 = \left(\frac{3}{2}\right)^3$$

$$x-6 = \frac{27}{8} + \frac{48}{8} \quad 4 \cdot \frac{3}{2}$$

$$+6 \quad +6 \quad 1 \cdot \frac{3}{2}$$

$$\frac{12}{6} = 6$$

$$6 = 6 \checkmark$$

$$\boxed{x = \frac{75}{8}}$$

$$30. \sqrt[3]{x} - 2 = 1$$

$$\begin{array}{r} +2 \quad +2 \\ \sqrt[3]{x} = 3 \end{array}$$

$$x = 27$$

$$\sqrt[3]{27} - 2 = 1$$

$$3 - 2 = 1$$

$$1 = 1 \checkmark$$

Find the first four terms of the sequence described:

$$31. a_1 = 4, r = -7$$

$$\frac{4}{a_1}, \frac{-28}{a_2}, \frac{112}{a_3}, \frac{-448}{a_4}$$

$$32. a_1 = 12, d = 4$$

$$\underline{12}, \underline{16}, \underline{20}, \underline{24}$$

Find the sum of the given series:

$$33. \sum_{k=3}^8 -2(-5)^{k-1}$$

$$34. 3 + 9 + 27 + \dots n = 14 \quad n = 14$$

$$r = 3$$

$$S_6 = 6 \left(\frac{-5^6 - 1}{-5 - 1} \right)$$

$$S_{14} = 14 \left(\frac{3^{14} - 1}{3 - 1} \right)$$

$$\boxed{S_6 = 15626}$$

$$\boxed{S_{14} = 33480776}$$

Find the specific term in the sequence.

$$35. a_{12} \text{ in the sequence of } \frac{1}{2}, 2, 8, \dots \quad r = 4$$

$$a_{12} = \frac{1}{2} (4)^{12-1}$$

$$\boxed{a_{12} = 2097152}$$

$$36. a_1 = -7, r = 3, a_{14} = ?$$

$$a_{14} = -7 (3)^{14-1}$$

$$\boxed{a_{14} = -11160261}$$

Use $f(x) = 2x^3 - 32x$ to answer the following questions.

$$2x(x^2 - 16) = 0$$

$$2x(x+4)(x-4) = 0$$

37. What is the degree of the polynomial?

- a. 0 b. 1 c. 3 d. 4

38. State the zeros of the function.

- a. (0,0); (-4,0); (4,0) b. (-4,0); (4,0) c. (0,0) d. (0,0); (16,0)

Use $f(x) = (x + 2)^2(x - 3)$ to answer the following questions.

	x^2	$+4x$	$+4$
x	x^3	$4x^2$	$4x$
-3	$-3x^2$	$-12x$	-12

39. What is the standard form of this equation?

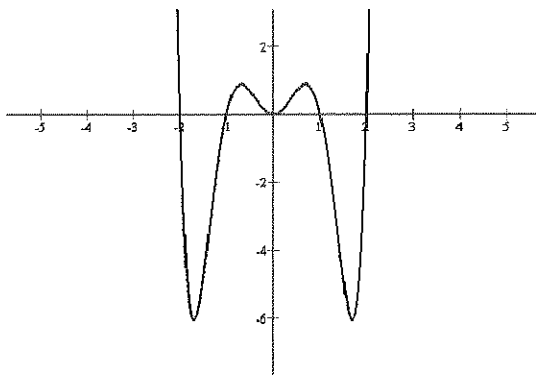
- a. $x^3 + x - 12$ b. $x^3 + x^2 - 8x - 6$
 c. $x^3 + x - 6$ d. $x^3 + x^2 - 8x - 12$

40. Which of the following is NOT a critical point? Decimals rounded to nearest tenth

- a. (1.3, -18.5) b. (-2,0) c. (3,0) d. All of these are

41. What is the degree of this function?

- a. 6 b. 5 c. 4 d. 3



♂

1. Write the equation for the given graph.

- a. $f(x) = x^6 + 4$
 b. $f(x) = -x^2(x+2)(x-2)(x+1)(x-1)$
 ~~$f(x) = -x^2(x+2)(x-2)(x+1)(x-1)$~~
 c. $f(x) = x^2(x+2)(x-2)(x+1)(x-1)$
 d. $f(x) = -x^6 + 4$