

Name: _____ Hr: _____

Algebra 2 CP – Semester Exam Review

- **GET ORGANIZED.** Successful studying begins with being organized. Bring this packet with you to class every day.
- **DO NOT FALL BEHIND.** Do the problems that are assigned every night and come to class prepared to ask about the things you could not do.
- **GET SERIOUS.** The grade you earn on this exam is worth **20% of your semester grade.**
- **MAKE NOTES AS YOU WORK.** As you do these problems, you will come across formulas, definitions, problems, and graphs that you will want to put on your notecard.
- **NOTECARD:** Your notecard must be in your own writing. You may put on it anything you think will help you on the exam. You may use the front and back. You will turn it in with your exam.
- There is nothing on the exam that you have not studied this year.
- You will turn in your review packet **before** you take your midterm.
- This packet is worth a **HUGE homework grade.** This grade is based on:
 - ✓ **Completion.** I will check each day to make sure that day's work is done.
 - ✓ **Correctness.** I will check random problems to make sure they are correct, or that you made corrections as needed.
 - ✓ **Participation.** I will keep track of people who are working during class. If a student is not working, points may be deducted from their packet.

Midterm Review Assignments

Chapter	DUE Date (Assignment will be checked on)	<input checked="" type="checkbox"/>
CH. 3 & CH. 4 ODDS	Monday, January 7 th	
CH. 3 & CH. 4 EVENS	Tuesday, January 8 th	
CH. 5 & CH. 6 ODDS	Wednesday, January 9 th	
CH. 5 & CH. 6 EVENS	Thursday, January 10 th	
CH. 11 ALL	Friday, January 11 th	
Notecard	Monday, January 14 th	

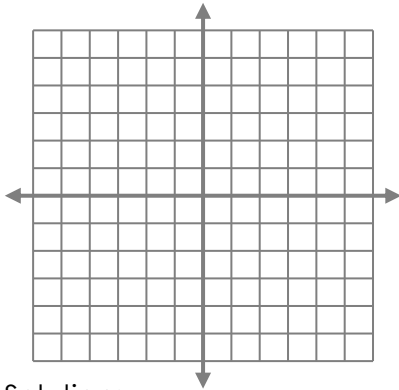
Your Exam is on _____ at _____

Midterm Review Chapter 3

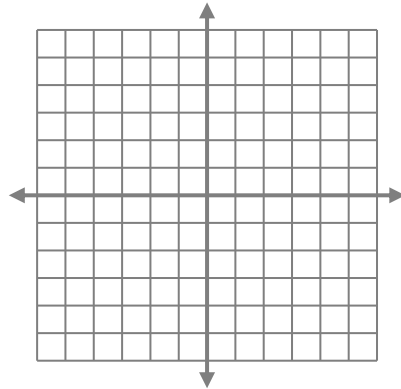
Solve the system by graphing.

1. $2x + y = -6$
 $3y = x + 3$

2. $3y = x + 6$
 $2x - 6y = -12$



Solution: _____



Solution: _____

Solve the system by substitution.

3. $x = 5y$
 $2x + 5y = 15$

4. $y - 2x = -7$
 $3x - 4y = 8$

5. $x - 6y = 4$
 $3x - 18y = 4$

Solve the system by elimination.

6. $x - 2y = 6$
 $x + 2y = 4$

7. $9x - 15y = 24$
 $6x - 10y = 16$

8. $x + 2y = 5$
 $-3x + 6y = 15$

9. The sum of two numbers is 20. Their difference is 4. What are the two numbers?

10. You will be making hanging flower baskets. The plants you have picked out are petunias and daisies. The petunias cost \$3.00 each and the daisies cost \$1.50 each. You bought a total of 24 plants for \$48.00. How many of each type of plant did you buy?
11. The perimeter of a rectangular garden is 104 ft. The length of the garden is 8 less than twice the width. What are the dimensions of the garden?
12. Stan bought 3 boxes of Froot Loops and 2 boxes of Kix for \$15.05. One box of Froot Loops cost \$0.60 more than one box of Kix. How much does one box of each type of cereal cost?

Midterm Review Chapter 4

Add or subtract the following polynomials. (Distribute if necessary, and then combine like terms)

1. $(2x - 2y) + (5x + 2y)$ 2. $(5x - 7) - (7x - 6)$ 3. $(-3x^3 + 12x^2 - 7x) - (9x^2 + 2x - 7)$

Multiply the following polynomials. Use distribution or FOIL

4. $-5x^2y^4(7x^5y + 3x^2y^3 - x^6y^4)$ 5. $(x + 2)(x - 3)$ 6. $(4x + 5y)(2x - 7y)$

7. $(x + 3)^2$

8. $(x - 4)(x^2 - 4x + 1)$

9. $2(x - 3)(x - 4)$

True or false?

10. $(a + b)^3 = a^3 + b^3$

11. $(a - b)(a^2 + ab + b^2) = a^3 - b^3$

12. $(a + b)(a^2 - ab + b^2) = a^3 + b^3$

Factor the following polynomials. Look for the greatest common factor, difference of squares, trinomials, and sum/difference of cubes – these will be in your chapter 5 notes!!!

13. $x^2 - 3x - 10$

14. $2y^2 - 50$

15. $3x^2 - 18x - 24$

16. $4a^2 + a - 3$

17. $x^3 + 3x^2 - 70x$

18. $m^3 - 1$

19. $27r^4y^9 + 18r^5y^6 - 72r^3y^3$

20. $81x^4 - 16$

21. $45x^2 - 80y^2$

22. $8a^3 - 27$

23. $c^2 + 6c - 7$

24. $6x^2 - 3x - 18$

Solve by factoring

25. $x^2 - 2x = 15$

26. $4c^2 = 20c$

27. $3x^2 + 4x - 15 = 0$

Simplify.

28. $(7 - 8i) + (-12 - 4i)$

29. $(10 - 4i) - (7 - 3i)$

30. $(-3 + 5i) + (18 - 7i)$

31. $(2 + i)(3 - 5i)$

32. $(7 - 6i)(2 - 3i)$

33. $(3 + 4i)(3 - 4i)$

34. $\frac{8-6i}{3i}$

35. $\frac{3i}{4+2i}$

Fill in the blanks to complete the square.

36. $x^2 - 14x + \underline{\hspace{2cm}} = (x \underline{\hspace{1cm}} \underline{\hspace{1cm}})^2$

37. $x^2 + 9x + \underline{\hspace{2cm}} = (x \underline{\hspace{1cm}} \underline{\hspace{1cm}})^2$

38. $m^2 - \frac{2}{3}m + \underline{\hspace{2cm}} = (m \underline{\hspace{1cm}} \underline{\hspace{1cm}})^2$

Solve by completing the square

39. $x^2 - 2x = 15$

40. $4x^2 - 8x - 12 = 0$

41. $x^2 - 7x + 5 = 0$

Write each quadratic function in vertex form by **COMPLETING THE SQUARE**. Identify the vertex, axis of symmetry and direction of opening.

42. $y = x^2 + 10x + 20$

43. $y = 2x^2 + 16x + 29$

Find the value of the discriminant and determine the nature of the roots.

Choices: 2 real roots, 1 real root, 2 complex roots

44. $4x^2 + 16x + 15 = 0$

45. $x^2 = -10x - 25$

46. $x^2 + 4x + 53 = 0$

Disc = _____

Disc = _____

Disc = _____

Nature of roots _____

Nature of roots _____

Nature of roots _____

Solve using the quadratic formula

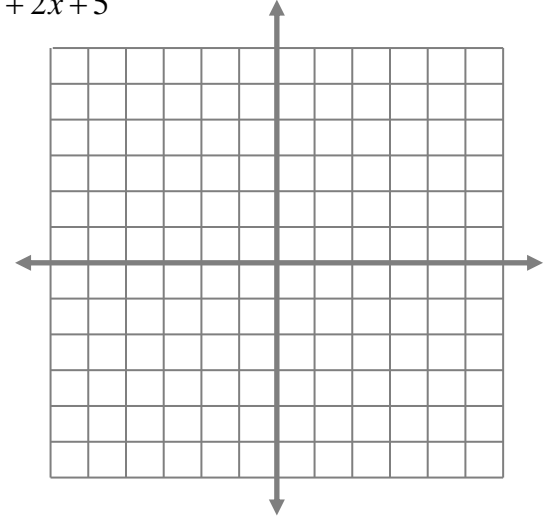
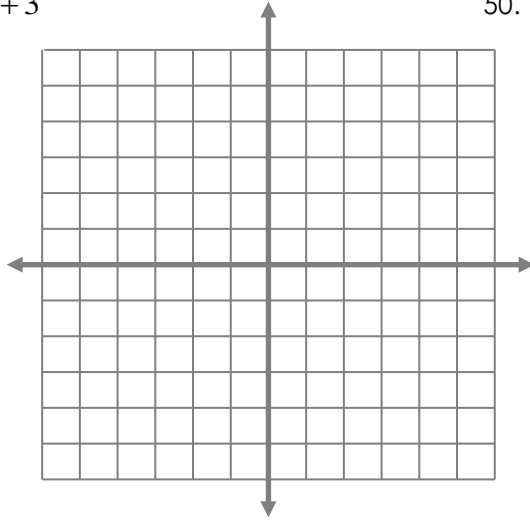
47. $3x^2 - 5x + 9 = 0$

48. $x^2 = 4x - 15$

Calculate the Axis of Symmetry and Vertex by hand, then graph the function. Also, state the domain and range.

49. $y = -x^2 + 8x + 3$

50. $f(x) = 2x^2 + 2x + 5$



51. If $y = ax^2 + bx + c$ opens up and has no real zeros, what must be true about a and c ?

Define a variable, write an equation and solve.

52. A sports team sells about 100 coupon books for \$30 each during its annual fund-raiser. They estimate that for each \$0.50 decrease in the price, they will sell about 10 more coupon books. How much should they charge for each book in order to maximize the income from their sales? What is the maximum monthly income the team can expect to make from these items?

53. The sum of two numbers is -1, and their product is -6. Write a quadratic equation to find the two numbers, then solve.

54. A rectangular parking lot measures 8 m by 4 m. You want to triple its area by adding the same distance x to the length and the width. Write and solve an equation to find the value of x . What are the new dimensions of the parking lot?

55. A surfboard shop sells 45 surfboards per month when it charges \$500 per surfboard. For each \$20 decrease in price, the store sells 5 more surfboards per month. How much should the shop charge per surfboard in order to maximize monthly revenue? What is the maximum monthly revenue?

56. Susan throws a ball straight into the air. The height $h(t)$ of the ball after t seconds is given by:

$$h(t) = -16t^2 + 60t$$

a. How long does it take for the ball to hit the ground?

b. What is the maximum height reached by the ball?

**Midterm Review
Chapter 5**

Simplify. Answer all questions using positive exponents!

1. $x^{10} \cdot x^{10}$

2. $\frac{x^{15}}{x^{10}}$

3. $(y^4)^4$

4. $(2a^2b^3)^4$

5. $4j(2j^{-2}k^2)(3j^3k^{-7})$

6. $(3a^0b^2)(2a^{-3}b^2)^2$

7. 2^{-3}

8. $\frac{1}{5^{-2}}$

9. $(m^2n^4)^{-2}$

10. $\frac{3(a^2b)^4}{(3ab)^3}$

11. $\frac{4^{-2}x^{-5}y^{-1}}{6y^{-2}x^{-3}}$

12. $\frac{1}{x^0 + y^0}$

Divide the following polynomials using synthetic division

13. $(2x^3 - 5x + 40) \div (x + 3)$

14. $(x^2 - 4x + 7) \div (x - 2)$

Divide the following polynomials using Long Division

15. $(6x^3 + x^2 + x) \div (2x + 1)$

16. $(4x^2 - 2x + 6) \div (2x - 3)$

Use direct substitution to find $f(2)$ and $f(-1)$ for each function

17. $f(x) = x^3 - 3x^2 + x - 2$

18. $f(x) = x^5 - 7x^3 - 4x + 10$

Find $p(-1)$ and $p(2)$ for each function using synthetic substitution.

19. $p(x) = 2x^2 - 4x + 1$

20. $p(x) = -2x^3 + 5x + 3$

Given a polynomial and one of its factors, find the remaining factors of the polynomial.

21. $x^3 + 3x^2 - 6x - 8; x - 2$

22. $4x^3 - 12x^2 - x + 3; x - 3$

Solve each equation by factoring. Then, state the number and types of roots.

23. $m^4 - 625 = 0$

24. $x^5 = 81x$

25. $x^4 - 5x^2 + 4 = 0$

List all the possible rational zeros of each function.

26. $p(x) = 2x^4 - 5x^3 + 8x^2 + 3x - 5$

27. $g(x) = x^5 - 7x^4 + 3x^2 + x - 20$

Find all of the zeros of each function.

28. $g(x) = x^3 - 3x^2 - 4x + 12$

29. $f(x) = 3x^3 - 9x^2 - 10x - 8$

Describe the end behavior for each.

30. $f(x) = -x^3 - 4x^2 + 5$

as $x \rightarrow -\infty, f(x) \rightarrow$ _____

as $x \rightarrow \infty, f(x) \rightarrow$ _____

31. $g(x) = 4x^4 - 3x^3 + x^2 + 1$

as $x \rightarrow -\infty, f(x) \rightarrow$ _____

as $x \rightarrow \infty, f(x) \rightarrow$ _____

Find the zeros, relative minimum(s) and relative maximum(s) and graph the following. Also state the domain and range.

32. $f(x) = 2x^3 - 3x^2 + 2$

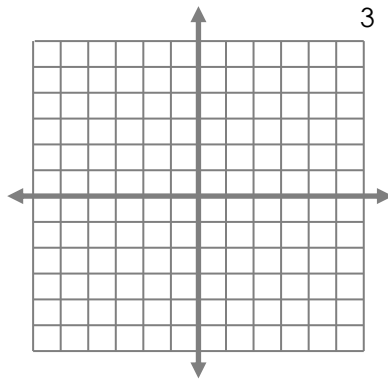
Zeros

Mins

Maxs

Domain

Range



x							
y							

33. $f(x) = 0.5x^4 - 4x^2 + 4$

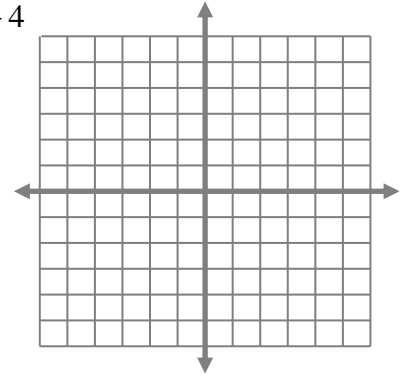
Zeros

Mins

Maxs

Domain

Range



x							
y							

34. $f(x) = x^3 - 4x^2 + 5$

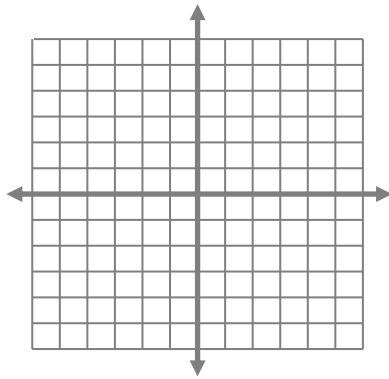
Zeros

Mins

Maxs

Domain

Range



x							
y							

35. $g(x) = x^4 - x^3 - 4x^2 + 1$

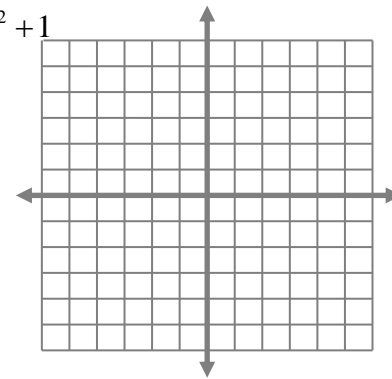
Zeros

Mins

Maxs

Domain

Range

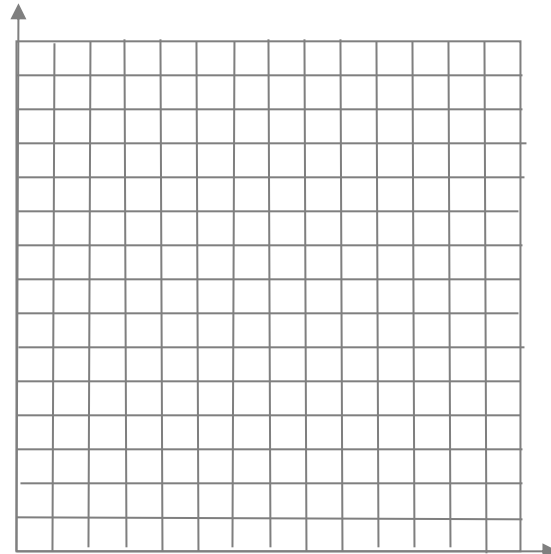


x							
y							

36. The weight w , in pounds, of a patient during a 7-week illness is modeled by the cubic equation:
 $w(n) = 0.1n^3 - 0.6n^2 + 110$, where n is the number of weeks since the patient became ill.

a. Graph the equation, and describe the turning points of the graph and its end behavior.

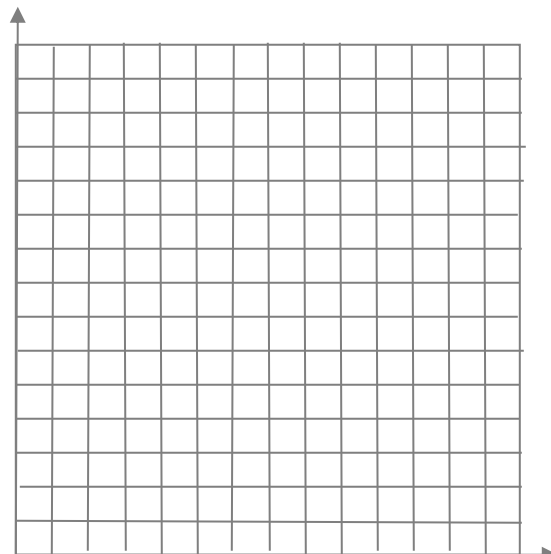
b. What trends in the patient's weight does the graph suggest? Is it reasonable to assume the trend will continue indefinitely?



37. The rainfall r , in inches per month, during a 7-month period is modeled by the equation:
 $r(m) = 0.01m^3 - 0.18m^2 + 0.67m + 3.23$, where m is the number of months after March 1.

a. Graph the equation, and describe the turning points of the graph and its end behavior.

b. What trends in the amount of rainfall received by the town does the graph suggest?



Use FOIL to write an equation with the following roots.

38. 3 and 5

39. $-4i$ and 2

40. $-\frac{2}{5}$ and $\frac{2}{7}$

**Midterm Review
Chapter 6**

Name _____

Simplify

1. $-\sqrt{121}$

2. $\sqrt[4]{16}$

3. $\sqrt[3]{64}$

4. $\sqrt{x^2 y^4}$

5. $\sqrt{x^2 y} \cdot \sqrt{x^3 y^7}$

6. $\sqrt[3]{a^2 b^5} \cdot \sqrt[3]{a^2 b}$

7. $5\sqrt{12}$

8. $(6\sqrt{3})(2\sqrt{6})$

9. $\frac{\sqrt{15}}{\sqrt{5}}$

10. $6\sqrt{2} + 3\sqrt{2} - 7$

11. $3\sqrt{16} - 4\sqrt{75} + \sqrt{3}$

12. $(4 + \sqrt{6})(4 - \sqrt{6})$

Rationalize the denominator.

13. $\frac{2}{\sqrt{6}}$

14. $\frac{5}{\sqrt[3]{2}}$

15. $\frac{3}{1 + \sqrt{2}}$

Express the following using rational exponents.

16. $\sqrt[4]{15}$

17. $\sqrt[3]{x^2}$

18. $\sqrt[7]{3x^2 y^4}$

Express the following in simplest radical form. No decimal answers.

19. $5r^{\frac{1}{6}}s^{\frac{5}{6}}$

20. $x^{\frac{4}{3}}y^{\frac{5}{2}}$

21. $\sqrt[6]{36}$

22. $4^{\frac{2}{3}}$

23. $\left(5^{\frac{4}{7}}\right)^{\frac{1}{4}}$

24. $8^{\frac{3}{4}}$

25. $2^{\frac{1}{2}} \cdot 2^{\frac{3}{4}}$

26. $\sqrt[5]{7} \cdot \sqrt[4]{7^3}$

27. $\sqrt[3]{\sqrt{16}}$

28. $\frac{x}{2x^{\frac{2}{3}}}$

29. $\frac{14y^{\frac{1}{5}}}{7y^{-\frac{2}{5}}}$

30. $\frac{3x^{\frac{2}{3}}}{x^{\frac{1}{6}}}$

Solve Each Equation.

31. $m^2 - 20 = 0$

32. $(x+4)^3 = -33$

33. $2(3x+1)^5 - 6 = 10$

34. $\sqrt{x-3} = 7$

35. $\sqrt[3]{2a+4} = 2$

36. $\sqrt{r+12} - \sqrt{r} = 2$

Solve the following equations.

37. $\sqrt{8x+9} + 3 = 6$

38. $\sqrt{7x-7} = \sqrt{3x-2}$

39. $x - 6 = \sqrt{3x}$

40. $2x^{\frac{3}{2}} = 16$

41. $(x-5)^{\frac{5}{3}} - 73 = 170$

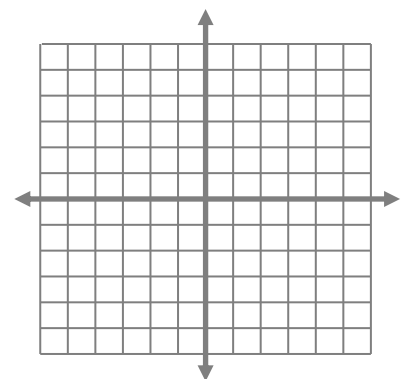
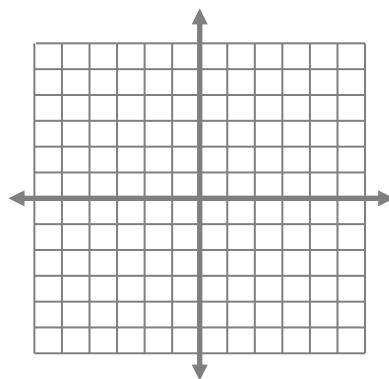
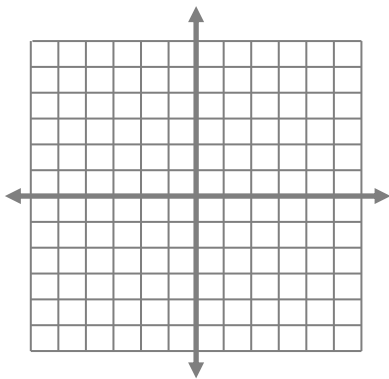
42. $\frac{1}{4}(7x+8)^{\frac{3}{2}} = 54$

Find the inverse of each function. Then graph the function and its inverse.

43. $g(x) = 2x - 1$

44. $f(x) = 3x$

45. $y = \frac{2}{3}x + 2$



Verify that each pair of functions are inverse functions. You must use the proof method demonstrated in class.

46. $\begin{cases} f(x) = 5x - 5 \\ g(x) = \frac{1}{5}x + 1 \end{cases}$

47. $\begin{cases} f(x) = 2x^3 \\ g(x) = \sqrt[3]{\frac{x}{2}} \end{cases}$

Find the inverse.

48. $f(x) = -\frac{1}{2}x + 1$

49. $g(x) = x^2 + 7; x \geq 0$

Given $f(x) = 3x^2 - 2x + 1$ and $g(x) = x - 4$ find the following and state the domain.

50. $f(x) + g(x)$

51. $f(x) - g(x)$

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

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

54. $f(g(7))$

55. $f(g(x))$

56. $g(f(x))$

Given $f(x) = 4x^{\frac{1}{3}} + 5$ and $g(x) = -3x^{\frac{1}{3}} - 6x$ find the following and state the domain.

57. $f(x) + g(x)$

58. $f(x) - g(x)$

59. $g(x) - f(x)$

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

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

Midterm Review Chapter 11

1. Of the 42 employees at Speedy Pizza, sixteen make \$4.75 an hour, four earn \$5.50 an hour, three earn \$6.85 an hour, six earn \$4.85 an hour and thirteen earn \$5.25 an hour. Find the mean, median and mode of the hourly wages.

Mean: _____

Median: _____

Mode: _____

2. Given the following set of data:

32, 45, 67, 93, 82, 55, 58, 45, 13, 54

- a) Make a stem and leaf plot of this data.

Stem	Leaf

- | | |
|---|----------|
| b) What is the minimum? | b) _____ |
| c) What is the maximum? | c) _____ |
| d) What is the range? | d) _____ |
| e) What is the mean? (to nearest tenth) | e) _____ |
| f) What is the mode? | f) _____ |
| g) What is the median? | g) _____ |

For the following set of data find the 5 number summary, ranges, and fences. Name any outliers.

3. 48, 3, 19, 17, 4, 4, 14, 3, 13, 19, 13, 7, 17, 10, 14

FIVE NUMBER SUMMARY	
Smallest number	
Lower quartile	
Median	
Upper quartile	
Largest number	

FENCES	
Range	
ICR	

OUTLIERS	
Outlier Number	
Lower fence	
Upper fence	

4. 323 people were surveyed. 46% responded that they did use e-mail.

- a) What is the margin of error for this survey? a) _____
- b) Give an interval that is likely to contain the exact percentage of people. b) _____
- c) If we wanted a margin of error of $\pm 5\%$, what would the sample size need to be? c) _____

5. Below are the weights of 14 people boarding a sailboat.

134, 167, 137, 138, 120, 134, 145, 155, 152, 159, 164, 135, 144, 156

- a. What is the mean weight? a. _____
- b. What is the standard deviation of the weights? b. _____
- c. Construct a normal distribution of the weights.
- d. Between what 2 numbers does 68% of the data lie? d. _____
- e. Between what 2 numbers does 95% of the data lie? e. _____
- f. Above what number can we find weights that are 3 or more standard deviations above of the mean? f. _____
- g. Calculate the z-score for a person weighing 135 pounds. g. _____
- h. What is the probability for a person to have a z-score of -2.5? h. _____