

## Algebra 2CP Fall Final Exam

### Can You...

- Solve an equation with one variable, including absolute value equations (1.3 and 1.4)
- Solve and graph inequalities, compound inequalities, and absolute value inequalities (1.5 and 1.6)
- Translate an algebraic expression into a variable expression (1.3)
- Solve a formula for a variable (1.3)
- Set-up and solve a word problem using one or more variables (1.3)
- Find the value of a function at a number and at an expression (2.1)
- Find the slope, x-intercept and y-intercept of a linear equation (2.2 and 2.3)
- Find the slope of a line given two points (2.3)
- Write a linear equation given various information (2.4)
- Graph linear equations and inequalities and absolute value equations and inequalities (2.3-2.7)
- Graph and solve a system of linear inequalities (3.3)
- Determine the number of solutions and solve a system of equations involving two variables (3.1 and 3.2)
- Use the properties of exponents, including negative exponents, to simplify expressions (6.1)
- Add, subtract, multiply and divide monomials and polynomials (6.2)
- Divide polynomials by binomials, including using long division and synthetic division (6.3)
- Factor polynomials (including the sum/difference of squares) using the methods demonstrated in class (6.4)
- Simplify radicals by using perfect cubes, squares, etc (7.4 and 7.5)
- Simplify radicals that have variables with exponents (7.6)
- Simplify expressions with fractional powers and apply laws of exponents to those powers (7.6)
- Graph a square root function and give its domain and range (7.3)
- Add, subtract, multiply and divide with radicals, including using the conjugate to rationalize a denominator (7.5)
- Solve a radical equation (7.7)
- Use  $y = a(x - h)^2 + k$  or  $y = ax^2 + bx + c$  to find the vertex, axis of symmetry, y-intercept and a graph (5.1)
- Find the zeros of a quadratic function (5.2 and 5.3)
- Add, subtract, multiply and divide expressions containing  $i$ , including simplifying expressions (5.4)
- Solve a quadratic eqn. by factoring, completing the square, square root property and quadratic formula (5.3-5.6)
- Use the discriminant find the nature of the roots of a quadratic equation (5.6)
- Solve and graph a quadratic inequality (5.8)
- Determine the maximum or minimum value for a parabola (5.1)
- Given two points, find the distance between them and the midpoint of the segment joining them (10.1)
- Graph a parabola, circle, ellipse and hyperbola (10.2-10.5)
- Write the equation of a circle satisfying given conditions (10.3)
- Identify a conic section from its equations (10.6)
- Solve a system of two conic equations or a system of one conic equation and a line, both algebraically and by analyzing a graph, and list all solutions as ordered pairs (10.7)
- Looking at a graph determine if the graph represents an odd-degree polynomial or an even-degree polynomial and tell the number of real zeros and imaginary zeros (6.5)
- Given a factor of a polynomial and find the remaining factors (6.9)
- Find all real zeros of a polynomial using the graphing calculator and tell how many complex zeros exist (6.8-6.9)
- Find the sum, difference, product and quotient of functions (7.1)
- Find the composition of functions (7.1)
- Find the inverse of a function and graph the function and its inverse (7.2)

**Fall Final Exam Review (Revised 2009)**  
**Algebra 2CP**

1) If  $q = 0.5$ ,  $r = 1.2$ ,  $s = -6$ , and  $t = 5$ , evaluate:

$$\frac{2r(4s-1)}{t} + q$$

2) Name the set(s) to which the following number belongs:  $-12$

3) Identify the additive and multiplicative inverse of the following:  $0.6$

4) Combine like terms:  $3(a + 2b) - 2(6a - 4b)$

5) Write an algebraic expression for the verbal expression: *Seven less than the product of 6 and some number.*

6) Solve:  $8s - 3 = 5(2s + 1)$

7) Solve the following for the variable  $b_1$ :

$$A = \frac{1}{2}h(b_1 + b_2)$$

8) If  $x = -2$  and  $y = 4$ , evaluate:  $|xy| + 3x$

9) Solve:  $|9 - x| = 5$

10) Solve:  $-3(y - 1) \geq -12$

11) Write and solve an inequality for: *The sum of twice a number and 5 is at most 17.*

12) Jane has \$500 in her account. She spends \$140 on groceries, \$90 on a DVD player, and \$35 on gas. Write an inequality to show Jane's expenditures and how much she has for other expenses,  $e$ .

13) Graph the solution set of  $3 + x < 10$  or  $x \geq 11$

14) Solve:  $|3x - 1| < 2$

15) Solve:  $|5m - 4| > 6$

16) Given:  $(3, 1), (1, -2), (-1, 1), (-2, 3)$  Determine the domain, range, and if it's a function or not

17) Find  $f(-3)$  if  $f(x) = 2x^2 + 4x - 1$

18) Write the following in Standard Form and identify the intercepts:  $y = -\frac{3}{2}x - 6$

19) Graph the equation:  $3x + 7y = 21$

20) Find the slope between:  $(-3, 4)$  and  $(12, -1)$

21) Write the slope of the line parallel to:  $y = 3x + 1$

22) Find the equation of the line passes through  $(5, 4)$

and is perpendicular to  $y = \frac{1}{3}x + 7$

23) Graph:  $2x - 4y > 8$

24) Graph:  $y = 2|x - 3| - 1$

25) Solve the system:  $6x + 4y = -2$  and  $y = x + 2$

26) Solve the system:  $3x - 7y = -14$  and  $5x + 2y = 45$

27) Graph:  $y \leq 2x$  and  $y \geq -0.5x - 3$

28) Graph, find the vertices of the feasible region, and then find the maximum and minimum values for the region:

$$\begin{aligned} x &\leq 5; & y &\geq -3x \\ 2y &\leq x + 7 \\ y &\geq x - 4 \\ f(x, y) &= 4x - 3y \end{aligned}$$

29) Jim has 15 bills in some combination of \$1, \$5, and \$20. Those 15 bills total \$123. He has twice as many \$5 bills than \$20 bills. Write (not solve) a system of equations to represent this.

30) The table shows the minimum wage from the Dept of Labor. Let  $t$  be the number of years since 1981. Write a prediction equation and estimate the wage for 2012.

$t$	Wage
0	\$3.35
9	\$3.80
10	\$4.25
15	\$4.75
16	\$5.15

31) Graph:  $y = x^2 + 4x - 3$

32) Determine whether the following has a maximum or a minimum, then find that value:

$$y = -2x^2 + 8x - 5$$

33) Factor:  $8x^4 + 2x^6 - 10x^3$

34) Factor:  $a^2 + 12a + 35$

35) Factor:  $d^2 + 4d - 21$

36) Factor:  $16x^2 + 40x + 25$

37) Factor:  $3x^2 + 21x + 36$

38) Factor:  $16x^2 - 9y^2$

39) Factor:  $3x^2 + 5x + 2$

40) Factor:  $x^3 - 8$

41) Factor:  $8a^3 + 27$

42) Solve:  $3x^2 - 10x - 8 = 0$

43) Solve:  $x^2 + 14x - 1 = 0$

44) Solve:  $x^2 - 6x + 9 = 25$

45) Write an equation given the roots:  $-3, \frac{4}{3}$

46) Simplify:  $\sqrt{-36m^6}$

47) Simplify:  $\sqrt{-27} \cdot \sqrt{-8}$

48) Simplify:  $(4i)^3$

49) Multiply:  $(3 + 2i)(4 - 6i)$

50) Divide:  $\frac{6 + 7i}{3 - i}$

51) Solve for  $m$  and  $n$ :  $-28m + 4i = 2 - 6ni$

52) Solve:  $x^2 + 4x + 20 = 0$

**Fall Final Exam Review (Revised 2009)**  
**Algebra 2CP**

53) What value should be added to each side to

complete the square:  $x^2 + 6x = 1$

54) What are the nature of the roots of the equation:

$$3x^2 + 6x - 2 = 0$$

55) Find the vertex:  $f(x) = -2(x + 2)^2 - 6$

56) Graph:  $y < -x^2 + 4x + 2$

57) Solve:  $x^2 - 6x < -5$

58) Simplify:  $(-2a^3b^2c)(5ab^6)$

59) Simplify:  $\frac{18m^2n^8}{-14m^4n^3}$

60) Express in Scientific Notation:

$$(3.5 \times 10^5)(2.7 \times 10^{-8})$$

61) Simplify:  $(3x^2 + 6) - (-7x^2 - 5x + 2)$

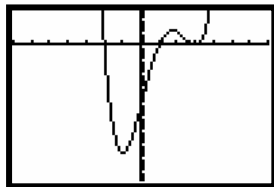
62) Simplify:  $(x - 2)(x^2 - 3x + 1)$

63) Divide:  $\frac{-4x^3 - 3x + 2}{x - 2}$

64) Reasonably graph:  $y = -(x + 2)(x - 4)^2$

65) Simplify:  $\sqrt{6a^5b^2} \cdot \sqrt{2a^2b^3}$

66) Determine whether the degree of the function is odd or even. How many different real zeros does the equation have?



67) Given that  $(x + 2)$  is a factor of

$f(x) = 2x^3 - 3x^2 - 11x + 6$ , find the remaining factors.

68) List all real zeros of:  $f(x) = 2x^4 + 3x^3 - 20x^2$

69) List the possible rational zeros of the following:

$$f(x) = 2x^3 - 3x^2 - 11x + 6$$

70) Find  $[f + g](x)$ , given:  $f(x) = 3x^2 + 4$   
 $g(x) = 5x - 2$

71) Find  $[f - g](x)$ , given:  $f(x) = 3x^2 + 4$   
 $g(x) = 5x - 2$

72) Find  $[g \circ f](x)$ , given:  $f(x) = 3x^2 + 4$   
 $g(x) = 5x - 2$

73) Find  $f^{-1}(x)$  if  $f(x) = 4x^2 - 1$

74) Given  $R = \{(3, 1), (1, -2), (-1, 1), (-2, 3)\}$ , find  $R^{-1}$ .

Is  $R^{-1}$  a function?

75) Simplify:  $\sqrt[5]{32a^{30}b^{20}}$

76) Simplify:  $8\sqrt{48} - 6\sqrt{75} + 7\sqrt{80}$

77) Simplify:  $\frac{2\sqrt{5}}{-4 + \sqrt{8}}$

78) Simplify:  $x^{2/5} \cdot x^{3/4}$

79) Write in radical form:  $m^{4/7}$

80) Write as a rational exponent:  $\sqrt[4]{a^6}$

81) Simplify:  $\sqrt[3]{9a^7b^5}$

82) Simplify:  $(3\sqrt{12})(2\sqrt{21})$

83) Solve:  $x^4 - 20x^2 + 64 = 0$

84) Solve:  $x - x^{1/2} - 6 = 0$

85) Find and graph the real roots of:  $x^2 + 2x - 8 = 0$

86) Find the graph, domain, and range of  $y = \sqrt{x - 2} + 1$

87) Solve:  $\sqrt{9x - 11} = x + 1$

88) Solve:  $\sqrt{x + 15} = 5 + \sqrt{x}$

89) Solve:  $\sqrt{3a - 1} \leq 5$

90) Find the distance between:  $(-3, 4)$  and  $(12, -1)$

91) Find the midpoint of:  $(-4, 5)$  and  $(8, -3)$

92) Write the equation of the circle with a center  $(5, -4)$  and radius 3

93) Graph:  $(x + 3)^2 + (y - 1)^2 = 16$

94) Graph:  $25x^2 + 9y^2 = 225$

95) Graph:  $\frac{y^2}{9} - \frac{x^2}{25} = 1$

96) Write the following equation in standard form:

$$x^2 + y^2 - 6x + 4y = 156$$

97) Write the equation of the circle whose endpoints of a diameter are:  $(5, -3)$  and  $(-3, 3)$

98) Identify the conic section given by the equation:

$$9x^2 - 18x + 16y^2 + 160y = -265$$

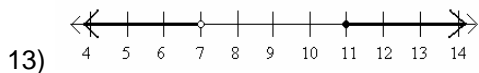
99) Solve the system:  $x^2 + y^2 = 13$  and  $x^2 - y^2 = -5$

100) Graph:  $\frac{x^2}{16} - \frac{y^2}{36} \geq 1$  and  $x^2 + y^2 \leq 49$

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**ANSWERS**

- 1) -11.5
- 2) Integer, Rational, Real
- 3) -0.6;  $1.\bar{6}$
- 4)  $-9a + 14b$
- 5)  $6n - 7$
- 6)  $s = -4$
- 7)  $b_1 = \frac{2A}{h} - b_2$
- 8) 2
- 9)  $x = 4$  or 14
- 10)  $y \leq 5$
- 11)  $2x + 5 \leq 17$ ;  $x \leq 6$
- 12)  $140 + 90 + 35 + e \leq 500$



13)  $-\frac{1}{3} < x < 1$

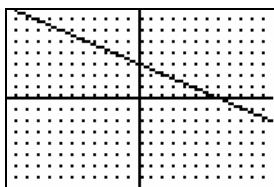
14)  $m < -\frac{2}{5}$  or  $m > 2$

15) D:  $\{3, 1, -1, -2\}$  R:  $\{1, -2, 3\}$ ;

yes

16)  $f(-3) = 5$

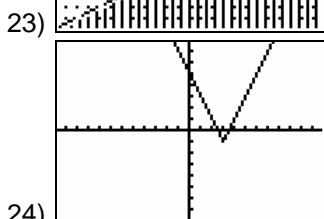
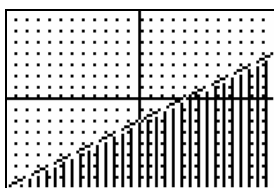
17)  $3x + 2y = -12$ ;  $(-4, 0)$  and  $(0, -6)$



18)  $m = -\frac{1}{3}$

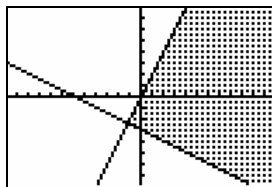
19)  $m = 3$

20)  $y = -3x + 19$

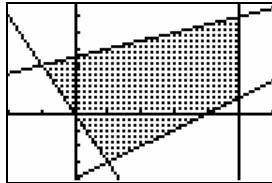


21)  $(-1, 1)$

22)  $(7, 5)$



23)  $(-1, 3), (1, -3), (5, 6), (5, 1)$



24)  $(-1, 3), (1, -3), (5, 6), (5, 1)$

Max: 17 at  $(5, 1)$ ; Min: -13 at  $(-1, 3)$

$o + f + t = 15$

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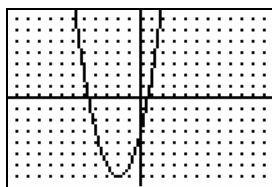
$o + f + t = 15$

25)  $10o + 5f + 20t = 123$

$f = 2t$

26)  $y = 0.1071x + 3.1890$

\$6.51 in 2012



27) Maximum; 3 at  $x = 2$

28) Maximum; 3 at  $x = 2$

29)  $2x^3(4x + x^3 - 5)$

30)  $(a + 5)(a + 7)$

31)  $(d + 7)(d - 3)$

32)  $(4x + 5)^2$

33)  $3(x + 3)(x + 4)$

34)  $(4x + 3y)(4x - 3y)$

35)  $(3x + 2)(x + 1)$

36)  $(x - 2)(x^2 + 2x + 4)$

37)  $(2a + 3)(4a^2 - 6a + 9)$

38)  $x = 4, -\frac{2}{3}$

39)  $x = -7 \pm 5\sqrt{2}$

40)  $x = 8, -2$

41)  $3x^2 + 5x - 12$

42)  $6m^3i$

43)  $-6\sqrt{6}$

44)  $-64i$

45)  $24 - 10i$

46)  $\frac{11 + 27i}{10}$

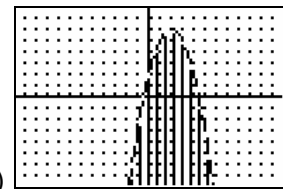
47)  $m = -\frac{1}{14}; n = -\frac{2}{3}$

48)  $x = -2 \pm 4i$

49) 9

50) 2 Real Roots

51)  $(-2, -6)$



52)  $1 < x < 5$

53)  $1 < x < 5$

54)  $-10a^4b^8c$

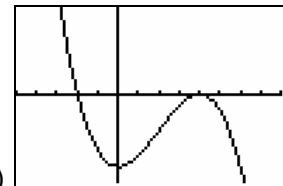
55)  $-\frac{9n^5}{7m^2}$

56)  $9.45 \times 10^{-3}$

57)  $10x^2 + 5x + 4$

58)  $x^3 - 5x^2 + 7x - 2$

59)  $-4x^2 - 8x - 19 - \frac{36}{x - 2}$



60)  $2a^3b^2\sqrt{3ab}$

61)  $2a^3b^2\sqrt{3ab}$

62) Even; 3 different real zeros

63)  $(x - 3)(2x - 1)$

64)  $x = -4, \frac{5}{2}, 0$  (double root)

65)  $\pm \frac{1}{1}, \pm \frac{2}{1}, \pm \frac{3}{1}, \pm \frac{6}{1}, \pm \frac{1}{2}, \pm \frac{3}{2}$

66)  $3x^2 + 5x + 2$

67)  $3x^2 - 5x + 6$

68)  $15x^2 + 18$

69)  $y = \pm \frac{\sqrt{x+1}}{2}$

Fall Final Exam Review (Revised 2009)  
Algebra 2CP

74)  $\{(1, 3), (-2, 1), (1, -1), (3, -2)\}$ ;

no

75)  $2a^6b^4$

76)  $2\sqrt{3} + 28\sqrt{5}$

77)  $\frac{-2\sqrt{5} - \sqrt{10}}{2}$

78)  $x^{23/20}$

79)  $\sqrt[7]{m^4}$  or  $(\sqrt[7]{m})^4$

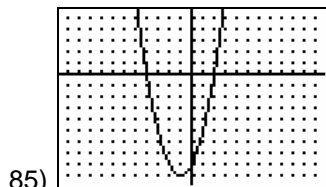
80)  $a^{3/2}$

81)  $a^2b \cdot \sqrt[3]{9ab^2}$

82)  $36\sqrt{7}$

83)  $x = \pm 2, \pm 4$

84)  $x = 9$



$x = -4, 2$



D:  $x \geq 2$  and R:  $y \geq 1$

87)  $x = 3$  or  $4$

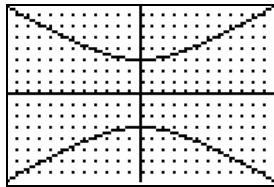
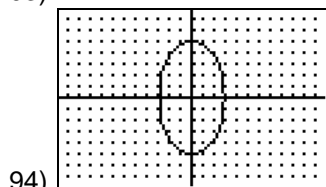
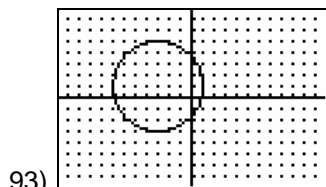
88) No Real Solution

89)  $\frac{1}{3} \leq a \leq \frac{26}{3}$

90)  $5\sqrt{10}$

91)  $(2, 1)$

92)  $(x-5)^2 + (y+4)^2 = 9$



96)  $(x-3)^2 + (y+2)^2 = 169$

97)  $(x-1)^2 + y^2 = 25$

98) Ellipse

99)  $(2, 3); (2, -3); (-2, 3); (-2, -3)$

