

Midterm REVIEW 2012-13

Simplify.

1) $(8 - 6i) - (6 + 7i)$

2) $(6 + 3i) + (-3 + 5i)$

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

4) $(5 - 2i)(5 - 6i)$

5) $(5 - 2i)^2$

6) $\frac{5i}{8 - 4i}$

7) $\frac{10i}{-2 + 10i}$

8) $\frac{3\sqrt{12}}{4\sqrt{75}}$

9) $\frac{3\sqrt{12}}{2\sqrt{4}}$

10) $\frac{4\sqrt{16}}{3\sqrt{9}}$

Solve each equation.

11) $3\frac{1}{2}k + \frac{19}{8} = \frac{11}{4}k + 1$

Solve each equation. Provide all possible answers.

12) $|4 + x| = 7$

13) $-7 + \left|\frac{b}{2}\right| = -12$

14) $2 + 7|n - 2| = 23$

Simplify. Your answer should contain only positive exponents.

15) $x^2y^3 \cdot yx^{-1}$

16) $4a^4b^{-1} \cdot 4a^{-4}b^{-4}$

17) $2b^4 \cdot (a^{-1}b^{-1})^{-1}$

18) $(2x^4y^4)^3 \cdot x^3y^4$

19) $\frac{4x^{-1}y^4}{3y^3}$

20) $\frac{3b^4}{4b^{-3}}$

21) $\frac{a^4b^3}{4ab^0}$

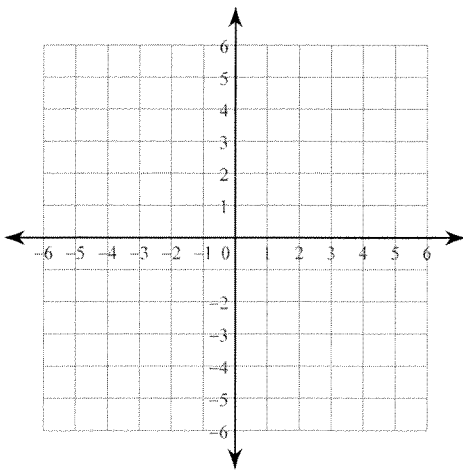
Evaluate each function.

22) $w(n) = n^2 + 1$; Find $w(-7)$

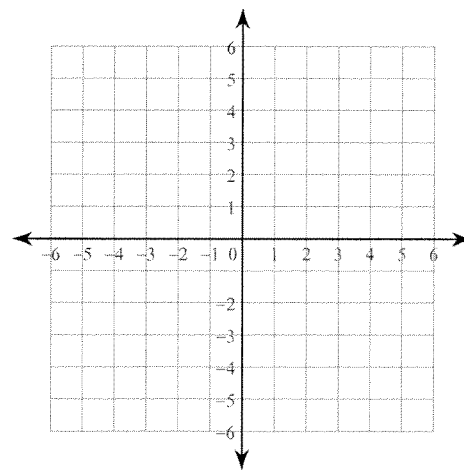
23) $w(x) = 2x$; Find $w(4)$

Graph each equation. State the range.

24) $y = |x| + 3$

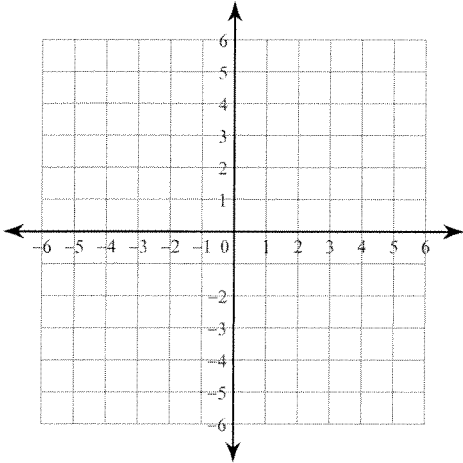


25) $y = -|x - 3| - 4$

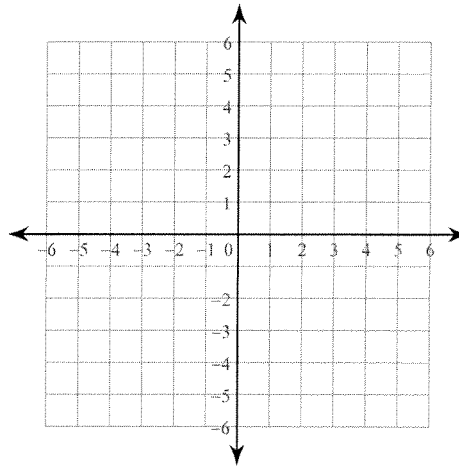


Sketch the graph of each linear inequality.

26) $2x - 3y \leq -6$



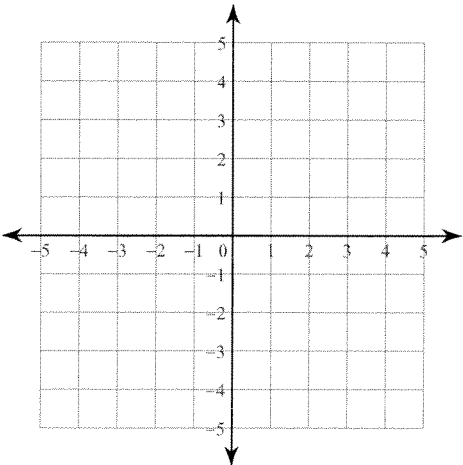
27) $y > -\frac{2}{5}x$



Sketch the solution to each system of inequalities. Name a point in the feasible region.

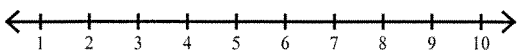
28) $y < -\frac{1}{2}x + 3$

$y \leq \frac{1}{2}x + 1$

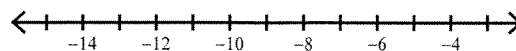


Solve each inequality and graph its solution. Provide Interval Notation with your answer and graph.

29) $|-5 + v| \leq 2$

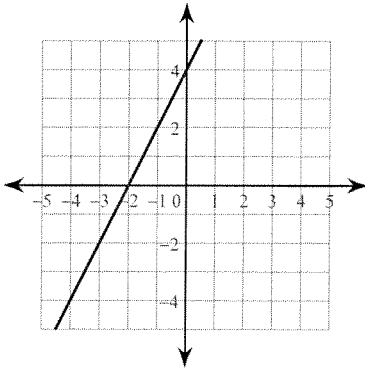


30) $|p + 8| > 2$

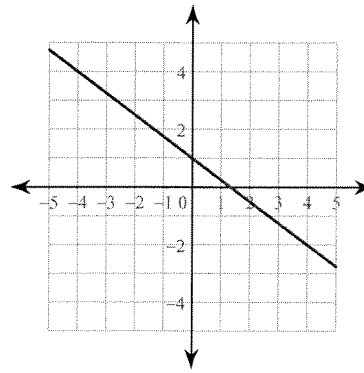


Write the slope-intercept form of the equation of each line.

31)



32)



Simplify completely.

33) $-4\sqrt{10}(2 - \sqrt{2})$

Simplify.

34) $-3\sqrt{225xy^4z^2}$

Solve each system by means of any method you choose.

35) $-2x - 3y = -15$
 $6x + 4y = 0$

36) $8x - 4y = 28$
 $-2x + y = -5$

37) $x - 3y = 19$
 $7x + 6y = 25$

38) Convert the following:

i^{45}

i^0

i^{103}

i^{-97}

Factor each completely.

39) $25n^3 - 40n^2 + 10n - 16$

40) $10x^3 - 35x^2 + 12x - 42$

41) $n^3 - 14n^2 + 45n$

42) $a^2 + 8a + 56$

43) $m^2 - 14m + 45$

44) $25a^2 - 4b^2$

45) $x^2 + 9y^2$

46) $125x^3 + 216y^3$

47) $64x^3 - y^3$

Find the discriminant of each quadratic equation then state the number and type of solutions.

48) $4x^2 - 4x - 8 = -9$

49) $3m^2 - 4m + 5 = 3$

Solve each equation by any method you choose.

50) $21x^2 = 392 - 119x$

51) $28v^2 - 96 = 52v$

52) $6n^2 - 3 = 147$

53) $9n^2 + 9 = -18$

54) $-5m^2 - 7 = -3m$

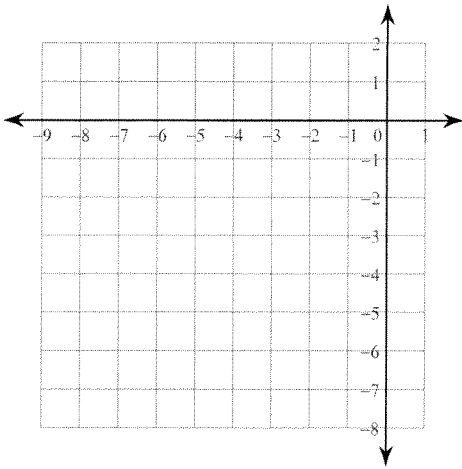
55) $-7a^2 - 2a = -12$

Solve each system of equations.

$$56) \begin{cases} x^2 - x - 5y - 36 = 0 \\ x - y - 4 = 0 \end{cases}$$

Sketch the graph of each function. Name a point in the feasible region.

$$57) y > -2(x + 2)^2 + 1$$



Simplify each expression.

$$58) \frac{a+8}{a+5} \cdot \frac{3}{a^2+15a+56}$$

$$59) \frac{10}{x^2+x-30} \div \frac{1}{x+6}$$

$$60) \frac{7m^3+14m^2}{m^2+6m+8} \cdot \frac{6m}{7m^2}$$

$$61) \frac{x+5}{x+4} \div \frac{7x+14}{x+4}$$

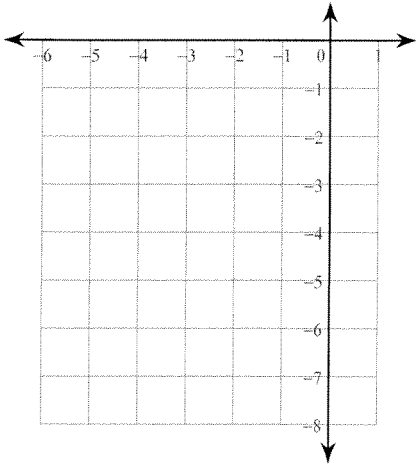
Evaluate each function at the given value.

$$62) f(n) = -n^3 + 9n^2 - 22n + 2 \text{ at } n = 4$$

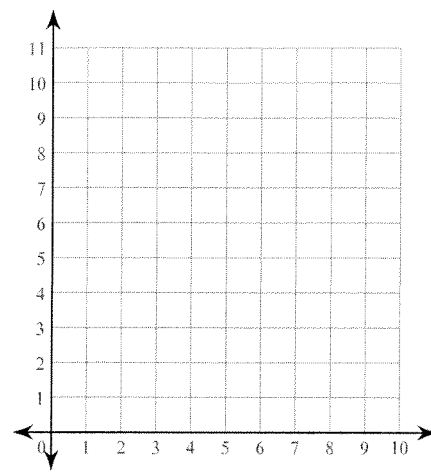
$$63) f(x) = -x^4 + 36x^2 - x + 2 \text{ at } x = -6$$

Sketch the graph of each function. Name the increasing and decreasing intervals. Provide the min or the max value.

64) $f(x) = -x^2 - 8x - 19$



65) $f(x) = 2(x - 3)^2 + 2$



Describe the end behavior of each function.

66) $f(x) = -x^4 + 4x^2 + 3x - 2$

67) $f(x) = -x^5 + 3x^3 + 3$

68) $f(x) = x^3 - x^2 - 1$

Simplify each expression.

69) $(-6k^3 - 5k^4 - 5) - (6k^3 + 6k^4) + (-3k^4 + 3k^3 - 7)$

70) $(-1 - 8x^2 + 7x) + (-3x + x^4) - (-6 - 7x^4 + 3x^2)$

Find each product.

71) $(7p + 2)(6p - 1)$

72) $(x + 2)(5x^2 - 7x - 3)$

Divide.

$$73) (x^3 + 3x^2 - 62x - 69) \div (x + 9)$$

$$74) (a^3 + 11a^2 + 28a - 10) \div (a + 5)$$

$$75) (27n^4 - 18n^3 + 45n - 52) \div (9n - 9)$$

Properties

76. Name the property of complex numbers in the following equation:

$$\frac{-3+4i}{5-i} \cdot \frac{5+i}{5+i} = \frac{-19}{26} + \frac{17}{26}i$$

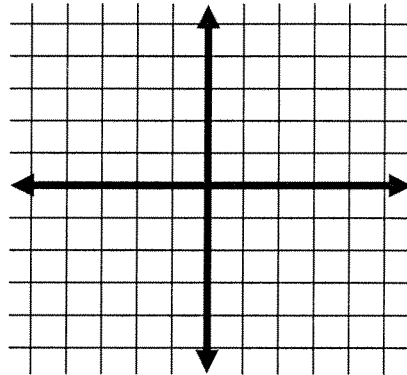
77. $(2 - 3i) + (-2 + 3i) = 0$

78. When $13zy = 5$ and $5 = -6wr$, it must be true that _____ = _____ according to the _____ property.

Piecewise

79. Graph the function $f(x)$.

$$f(x) = \begin{cases} \frac{1}{3}x + 1, & x \geq 0 \\ -x - 2, & x < 0 \end{cases}$$

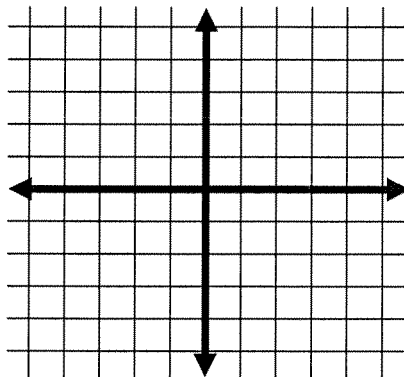


Evaluate $f(x)$ at the following:

- a) $f(-2) = \underline{\hspace{2cm}}$ b) $f(0) = \underline{\hspace{2cm}}$ c) $f(3) = \underline{\hspace{2cm}}$

80. Graph $g(x)$

$$g(x) = \begin{cases} 1, & \text{if } -4 \leq x < -2 \\ 2, & \text{if } -2 \leq x < 0 \\ 3, & \text{if } 0 \leq x < 2 \\ 4, & \text{if } 2 \leq x < 4 \end{cases}$$



Evaluate $g(x)$ at the following:

- a) $g(-8) = \underline{\hspace{2cm}}$ b) $g(0) = \underline{\hspace{2cm}}$ c) $g(1) = \underline{\hspace{2cm}}$ d) $g(4) = \underline{\hspace{2cm}}$

Complex Numbers

81. If $9 - i$ is the sum of two complex numbers, and one of the binomials is $12 - 5i$, which of the following represents the other binomial?

A $21 + 4i$ B $-3 - 6i$ C $21 - 6i$ D $-3 + 4i$

82. Perform the indicated operation and simplify $(7 - 6i)(3 + 2i)$.

A $33 - 4i$ B $33 - 32i$ C $9 - 4i$ D $9 + 32i$

83. Which of the following are equivalent to i^{63} ?

I	$-i$	II	i	III	i^{12}
IV	i^{15}	V	i^4		

A II only B I and IV only C III and V only D II, IV and V only

Solving

84. Solve $2|3x - 5| - 4 = 12$.

A $\{ \}$ B $\left\{ \frac{13}{3} \right\}$ C $\left\{ -\frac{13}{3}, \frac{13}{3} \right\}$ D $\left\{ -1, \frac{13}{3} \right\}$

85. Solve $\frac{1}{2}|3 - x| + 11 = 4$.

A $\{ \}$ B $\{17\}$ C $\{-17\}$ D $\{-11, 17\}$

86. Identify all x - and y - intercepts of $x^3 + x^2 - 4x - 4$.

A $\{(\pm 2, 0), (-1, 0)(0, -4)\}$ B $\{(2, 0), (-1, 0)(0, -4)\}$

C $\{(\pm 2, 0), (0, -1)(-4, 0)\}$ D $\{(-2, 0), (0, -1)(-4, 0)\}$

87. Solve $5 - 2(3x^2 - 2x) = x^2 + 7 - 2x^2$

A $\left\{\frac{-4 \pm i\sqrt{6}}{5}\right\}$ B $\left\{\frac{-4 \pm \sqrt{6}}{5}\right\}$ C $\left\{\frac{2 \pm i\sqrt{6}}{5}\right\}$ D $\left\{\frac{2 \pm \sqrt{6}}{5}\right\}$

88. Solve: $5(x + 3)^2 + 10 = -15$

Simplify

89. Simplify $\frac{8a^3 - b^3}{8a^2 - 26a + 15} \cdot \frac{4a^2 + 21a - 18}{4a^2 - b^2}$ completely

A $\frac{(a+6)(4a^2 + 2ab + b^2)}{(2a-5)(2a+b)}$ B $\frac{2(a-3)(4a^2 + 2ab + b^2)}{(4a-5)(2a+b)}$

C $\frac{(a+6)(2a-b)}{(2a-5)}$ D $\frac{(a+6)(2a+b)}{(2a-5)}$

Quadratics

90. Write the quadratic in vertex form whose graph has the given vertex $(-1, 4)$ and passes through the given point $(2, -1)$.

91. Write a quadratic in intercept form whose graph has given intercepts, -1 and 4 , and passes through the given point $(2, 4)$.

92. Using this set of data along with your graphing calculator, find the best fitting equation and then make the prediction asked for below.

The concentration (in milligrams per liter) of a medication in a patient's blood as time passes is given by the data in the following table:

Time (hours)	0	0.5	1.0	1.5	2.0	2.5
Concentration (mg/l)	0	78.1	99.8	84.4	50.1	15.6

What is the best fit equation that you found? _____

What is the concentration of medicine in the blood after 4 hours has passed? (based on the equation that you found) _____

Interpret this value. _____

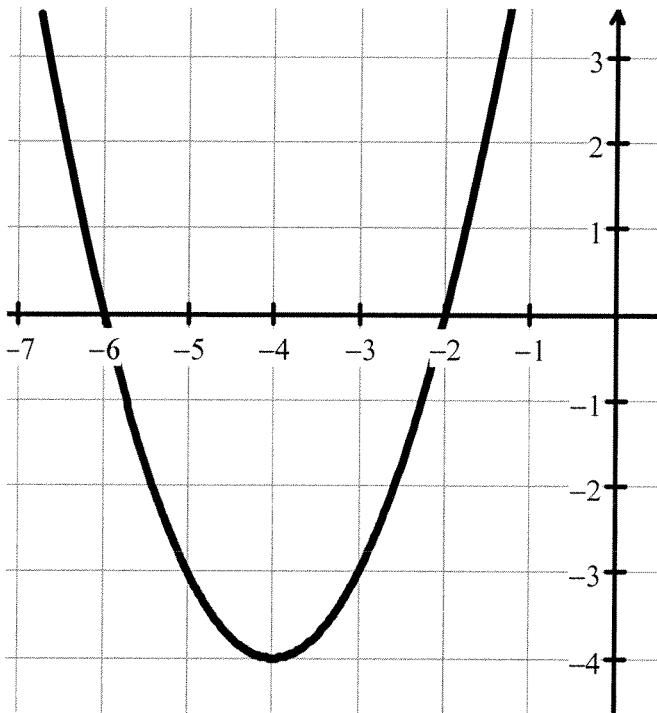
93.

Find each. Also, label each on the diagram.

- a) Vertex: _____
- b) Axis of Symmetry: _____
- c) x-intercepts = roots = zeros = solutions

Determine:

- d) The equation of parabola in intercept form
- e) The equation of parabola in vertex form
- f) The equation of parabola in standard form
- g) The intervals where $f(x)$ is increasing
- h) The intervals where $f(x)$ is decreasing
- i) The min or max value



94. Given the following system and the ordered pairs listed, identify ALL solutions within the choices given. There will be more than one to identify.

$$y < -2x^2 + 4x + 2$$

$$y \leq 2.5$$

(-1, 1) (0, 0) (1, 1.5) (0, 2)

(3, -1) (1, -2) (1, 5)

Evaluate

95.

Evaluate the given expression if $k = -48$.

$5|k + 10| - |4k|$

a. 382

b. 2

c. -10

d. -2

Miscellaneous

96. The function $y = |x + 5|$ is stretched, or made narrower. Which of the following could represent the new function?

a. $y = -|x + 5|$ b. $y = -\frac{1}{2}|x + 5|$ c. $y = \frac{2}{3}|x + 5|$ d. $y = \frac{4}{3}|x + 5|$

97. Simplify:

$$\frac{-6p^3q^{-2}}{(pq^2)^{-3}} \cdot \frac{(p^{15}q^{-8})^0}{3q^4}$$

98. Simplify: $(2a - 5b)^2$

99. Find: $|-2 + 7i|$