

Honors Algebra II
Fall Semester Exam Review

The semester exam will consist of 40 multiple-choice and 10 free-response questions taken from the topics presented during the fall semester. The exam is comprehensive, covering concepts presented in Chapters 1-6, 9, and other supplemented lessons.

The types of problems that follow are representative of those on the actual exam (these are all free-response instead of multiple-choice, however). It is suggested that you also study previous chapter exams, including the 1st Quarter Exam (available in class only).

Answers to these problems are at the end of the document.

Problems

Sketch a graph for each of the following functions, then state its domain and range.

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

Solve each equation.

3) $-2(x - 4) = 12$	4) $ 2x - 3 = 5$
5) $-2 3x - 1 = -8$	6) $3(4x - 2) + 5 < 4(1 - 2x)$
7) $\frac{4}{5} - \frac{1}{3}m = \frac{1}{30}$	8) $ 2x - 5 < 9$
9) $ 3x + 4 \geq 2$	10) $4y - 3z = 2z + 8$ (solve for y)

Graph the following.

11) $y = 2x + 7$	12) $3x + 4y = 8$
13) $x = -3$	14) $y = 2 x + 1 - 4$
15) $y \geq 6$	16) $3x - y < 9$

Find the slope of the line that contains the following points.

17) $(1, -3)$ and $(6, -3)$	18) $(9, 1)$ and $(-5, 2)$
-----------------------------	----------------------------

Write the equation of the line that passes through the given points.

19) $(-7, 5)$ and $(-7, 4)$	20) $(3, -7)$ and $(8, 2)$
-----------------------------	----------------------------

Answer the following.

- 21) Find the x - and y -intercepts of $y = 2|x + 3|$.
- 22) Find the x - and y -intercepts of $2x - 5y = 20$.
- 23) Write the equation of the line that passes through the point $(6, 1)$ and is (a) parallel to and (b) perpendicular to the line $2x - 3y = 5$.
- 24) Write the equation for the function with the following conditions: the parent function $y = |x|$ reflected vertically about the x -axis and shifted left 8 units and down 5 units.

Solve each system of equations, then classify each as consistent/independent, consistent/dependent, or inconsistent.

25)
$$\begin{cases} -x + 2y = 11 \\ 3x - 2y = -13 \end{cases}$$

26)
$$\begin{cases} y = \frac{2x-1}{5} \\ 2x - 5y = 1 \end{cases}$$

27)
$$\begin{cases} x + y + 3z = 20 \\ 2x + 4y + 5z = 30 \\ x + y + 4z = 26 \end{cases}$$

28)
$$\begin{cases} 3x - 4y + 4z = 15 \\ 3x - 6y + 2z = 0 \\ -6x + 8y - 8z = -10 \end{cases}$$

Answer the following.

- 29) Find the **sum** of the x - and y -coordinates of the solution of the system $\begin{cases} 2x - 2y = -8 \\ 7x + 6y = 11 \end{cases}$.
- 30) Find all solutions of $x(x-3)(x+5) = 0$.
- 31) Find all solutions $|x+5| = 10$.

Graph the feasible region, and then find the minimum and maximum values of the objective function.

32) $f(x, y) = 4x + 2y$

$$\begin{cases} y \geq 0, & x \geq 0 \\ 5x + 9y \geq 180 \\ x + y \geq 28 \end{cases}$$

33) $f(x, y) = 12x + 18y$

$$\begin{cases} 0 \leq x \leq 60 \\ 0 \leq y \leq 45 \\ 3x + 4y \leq 240 \end{cases}$$

Evaluate the following determinants.

$$34) \begin{vmatrix} 6 & -3 \\ 2 & 5 \end{vmatrix}$$

$$35) \begin{vmatrix} a & 1 \\ -3 & 2 \end{vmatrix}$$

$$36) \begin{vmatrix} -3 & 1 & 0 \\ 2 & -1 & 1 \\ 0 & 3 & 4 \end{vmatrix}$$

$$37) \begin{vmatrix} 2 & 1 & 5 \\ -1 & 6 & 3 \\ 2 & -4 & 2 \end{vmatrix}$$

Use the following matrices to answer Questions 39-43.

$$A = \begin{bmatrix} 3 & 5 \\ 4 & 7 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 \\ 4 & 9 \\ 7 & 1 \end{bmatrix} \quad C = \begin{bmatrix} 3 & 2 & 0 \\ 1 & -1 & -2 \\ -3 & 4 & 2 \end{bmatrix} \quad D = \begin{bmatrix} 1 & 3 \\ 5 & 6 \\ -8 & -12 \end{bmatrix} \quad E = \begin{bmatrix} -2 & 3 \\ 1 & -2 \end{bmatrix} \quad F = \begin{bmatrix} 2 & -2 \\ -1 & 1 \end{bmatrix}$$

$$38) \quad 3B - 4D$$

$$39) \quad CB$$

$$40) \quad A^{-1}$$

$$41) \quad DC$$

$$42) \quad \text{Solve for } X: EX = AF$$

$$43) \quad \text{Solve for } X: FX = EA$$

Simplify.

$$44) \quad (-3p^4q^{-3})^2(4p^{-5}q^7)$$

$$45) \quad \left(\frac{3u^{-4}v^3}{2u^{-5}v}\right)^{-2}$$

$$46) \quad \frac{x^2(y^{-3}z)^{-2}}{x^5y^3z^3}$$

$$47) \quad \frac{12a^{1/2}b^{-1/3}}{18a^{-5/4}b^{8/3}}$$

$$48) \quad (2u^2 - 5v)^2$$

$$49) \quad (2x - 3)(2x^2 + 3x - 5)$$

Factor.

$$50) \quad 25z^2 - 16$$

$$51) \quad h^3 + 125$$

$$52) \quad 4p^{10} - 9q^8$$

$$53) \quad 27n^3 - 64m^3$$

$$54) \quad 80r^4 - 45s^2$$

$$55) \quad 4y^2 + 12y + 9$$

$$56) \quad 2x^2 + x - 10$$

$$57) \quad 21 - 7y + 3x - xy$$

Solve.

58) $6x^2 = x + 12$

59) $x^2 - 3x - 28 = 0$

60) $4w^2 = 11w - 6$

61) $3x^3 - 6x^2 = 9x$

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

63) $4x^2 - 4x + 17 = 0$

Simplify.

64) $\frac{3x-21}{4} \cdot \frac{8}{x-7}$

65) $\frac{y^2+5y}{y^2+6y+5} \div \frac{y^3}{3y+3}$

66) $\frac{u^3-3u^2-4u}{u^2-8u+16} \cdot \frac{u^2-16}{3u^2+3u}$

67) $\frac{x^3+y^3}{x^2-y^2} \div \frac{x+y}{y-x}$

68) $\frac{4}{r+5} + \frac{3r+7}{2r+10}$

69) $\frac{x-8}{x^2-6x+8} - \frac{x+6}{x^2+x-6}$

70) $\frac{\frac{1}{2x+1} - \frac{3}{8x+4}}{\frac{x}{2x+1}}$

71) $\frac{\frac{4}{x^2-9} + \frac{2}{x-3}}{\frac{1}{x+3} + \frac{1}{x-3}}$

72) $\frac{x}{x^2-16} - \frac{x-2}{x(x+4)}$

73) $\frac{\frac{4x^3-40x^2}{2x+10}}{\frac{x^3-9x^2-10x}{x+5}}$

Solve.

74) $\frac{x}{x-1} = \frac{2x+10}{x+11}$

75) $\frac{2}{x-2} - \frac{2x}{3} = \frac{x-3}{3}$

76) $\frac{x+3}{x} - 1 = \frac{1}{x-1}$

Divide.

77) $(2x^3 + 4x^2 - 3x + 1) \div (x - 5)$

78) $(-6x^4 + 3x^3 - x + 6) \div (x + 2)$

Answer the following.

79) Find the area of triangle with coordinates (6, 3), (1, 5), and (-1, 4).

80) Find the other factors of $2x^3 + 4x^2 - 2x - 4$ given that $(x - 1)$ is a factor.

Simplify.

81) $\frac{1}{3}\sqrt{27} - 2\sqrt{75} + 5\sqrt{12}$

82) $5\sqrt[3]{24} - 2\sqrt[3]{54} + \sqrt[3]{3000}$

83) $(\sqrt{2} - \sqrt{7})^2$

84) $3x\sqrt{80x^3} - \frac{1}{3}\sqrt{180x^5} + \sqrt{320x}$

85) $(3\sqrt{5} - 4)(3\sqrt{5} + 4)$

86) $\sqrt{5x^3y^4} \cdot \sqrt{15x^2y}$

Use data in the table below to answer the following.

altitude (ft)	7500	8200	8600	9200	9700	10,400
temperature (°F)	61	58	56	53	50	46

87) Write the equation for the line of best fit.

88) Find the rate of change.

89) Predict the temperature when the altitude is 12,000ft.

Solve.

90) $\sqrt{3x-8} + 1 = 3$

91) $\sqrt[3]{b+12} = 5$

92) $x - \sqrt{2x} = 4$

93) $\sqrt{x^2+5} = x+3$

94) $\sqrt{x+3} = \sqrt{2x-1}$

Express in lowest terms of i

95) i^{12}

96) i^{34}

97) i^{17}

Simplify.

98) $\sqrt{-12}$

99) $\sqrt{-9} \cdot \sqrt{-25}$

100) $3\sqrt{-10} \cdot \sqrt{-15}$

101) $\frac{-20}{4i}$

102) $\frac{3+2i}{5-4i}$

103) $\frac{7-5i}{4+3i}$

Simplify.

104) $(-8 + 2i)(7 + 3i)$

105) $3\sqrt{-24} - \sqrt{-18} - \sqrt{-96} + 2\sqrt{-50}$

Solve over \mathbb{C} .

106) $3x^2 + 12 = 0$

107) $x^4 - 5x^2 - 36 = 0$

108) $x^4 - 16 = 0$

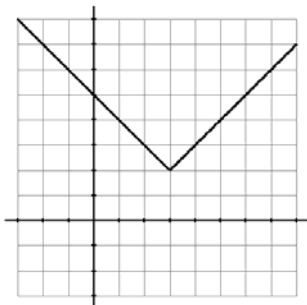
Answer the following.

- 109) One copy machine can complete a job in 12 minutes. A newer model can complete the same job in 9 minutes. How long would it take to complete the job if both machines were used?
- 110) Two harvesting machines can each harvest a field in 15 hours. If they are joined by a newer machine, and the three machines work together, the job takes 3 hours. How long would it take for the newer machine to harvest the field alone?
- 111) With a given tail wind, a certain plane can fly 1440km in 2.5 hours. Flying in the opposite direction with the same wind blowing, the plane can fly the same distance in 3 hours. What is the plane's air speed?
- 112) A man rows a boat 500 feet upstream against a constant current in 10 minutes. He then rows 300ft downstream, with the same current, in 5 minutes. Find the speed of the current and the equivalent rate at which he can row in still water.

Answers

Sketch a graph for each of the following functions, then state its domain and range.

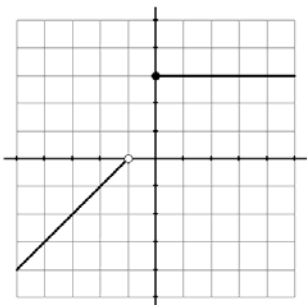
1)



Domain: $(-\infty, \infty)$ or *all real numbers*

Range: $[2, \infty)$ or $\{y \mid y \geq 2\}$

2)



Domain: $(-\infty, -1) \cup [0, \infty)$ or $\{x \mid x < -1 \text{ or } x \geq 0\}$

Range: $(-\infty, 0) \cup 3$ or $\{y \mid y < 0 \text{ or } y = 3\}$

3) $x = -2$

4) $x = -1, 4$

5) $x = -1, 5/3$

6) $(-\infty, 1/4)$

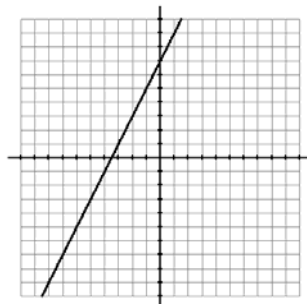
7) $m = 23/10$

8) $(-2, 7)$

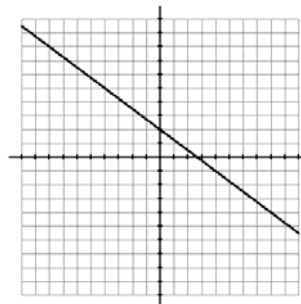
9) $(-\infty, -2] \cup [-2/3, \infty)$

10) $y = (5/4)z + 2$

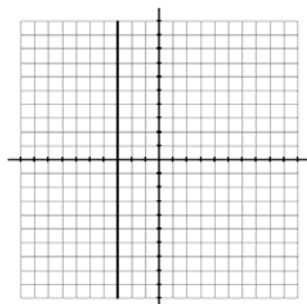
11)



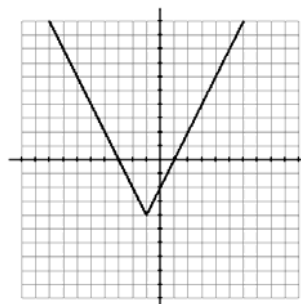
12)



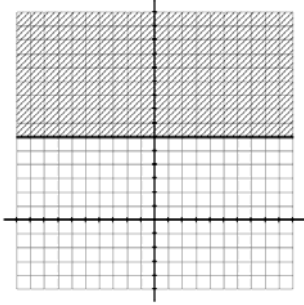
13)



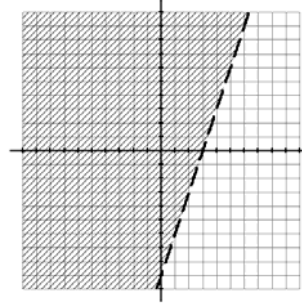
14)



15)



16)



17) $m = 0$

18) $m = -1/14$

19) $x = -7$

20) $9x - 5y = 62$

21) $(-3, 0)$ and $(0, 6)$

22) $(10, 0)$ and $(0, -4)$

23) (a) $2x - 3y = 9$
 (b) $3x + 2y = 20$

24) $y = -|x + 8| - 5$

25) $(-1, 5)$
 consistent/independent

26) *infinitely many solutions*
 consistent/dependent

27) $(4, -2, 6)$
 consistent/independent

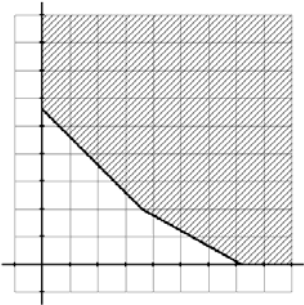
28) *no solution*
 inconsistent

29) $-1 + 3 = 2$

30) $x = -5, 0, 3$

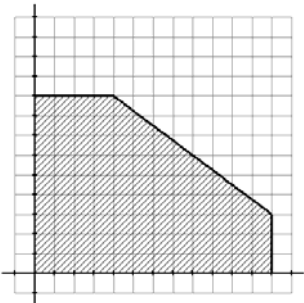
31) $x = -15, 5$

32)



minimum value at $f(0, 28) = 56$
 no maximum value

33)



minimum value at $f(0, 0) = 0$
 maximum value at $f(20, 45) = 1050$

34) 36

36) 13

38)
$$\begin{bmatrix} -1 & -6 \\ -8 & 3 \\ 53 & 51 \end{bmatrix}$$

40)
$$\begin{bmatrix} 7 & -5 \\ -4 & 3 \end{bmatrix}$$

42)
$$X = E^{-1}(AF) = \begin{bmatrix} -5 & 5 \\ -3 & 3 \end{bmatrix}$$

44) $36p^3q$

46)
$$\frac{y^3}{x^3z^5}$$

48) $4u^4 - 20u^2v + 25v^2$

50) $(5z + 4)(5z - 4)$

52) $(2p^5 + 3q^4)(2p^5 - 3q^4)$

54) $5(4r^2 + 3s)(4r^2 - 3s)$

56) $(2x + 5)(x - 2)$

58) $x = -4/3, 3/2$

60) $w = 3/4, 2$

62) $x = 3 \pm \sqrt{6}$

64) 6

66)
$$\frac{u+4}{3}$$

68) $3/2$

70)
$$\frac{1}{4x}$$

35) $2a + 3$

37) 16

39)
$$\begin{bmatrix} 11 & 24 \\ -17 & -9 \\ 27 & 32 \end{bmatrix}$$

41) *cannot be calculated*43) *no solution*

45)
$$\frac{4}{9u^2v^4}$$

47)
$$\frac{2a^{7/4}}{3b^3}$$

49) $4x^3 - 19x + 15$

51) $(h + 5)(h^2 - 5h + 25)$

53) $(3n - 4m)(9n^2 + 12mn + 16m^2)$

55) $(2y + 3)^2$

57) $(7 + x)(3 - y)$

59) $x = -4, 7$

61) $x = -1, 0, 3$

63) $x = 1/2 \pm 2i$

65)
$$\frac{2}{y^2}$$

67)
$$\frac{-(x^2 - xy + y^2)}{x + y}$$

69)
$$\frac{-7x}{(x-4)(x-2)(x+3)}$$

71)
$$\frac{x+5}{x}$$

72) $\frac{6x-8}{x(x+4)(x-4)}$

74) $x = -2, 5$

76) $x = 3/2$

77) $2x^2 + 14x + 67 + \frac{336}{x-5}$

79) $A = 9/2$

81) $\sqrt{3}$

83) $9 - 2\sqrt{14}$

85) 29

87) $T = -0.00521a + 100.503$

89) about $38^\circ F$

90) $x = 4$

92) $x = 8$

94) $x = 4$

95) 1

97) i

98) $2i\sqrt{3}$

100) $-15\sqrt{6}$

102) $\frac{7}{41} + \frac{22}{41}i$

104) $-62 - 10i$

106) $x = \pm 2i$

108) $x = \pm 2, \pm 2i$

109) about 5.143 min

111) 528 km/h

73) $\frac{2x}{x+1}$

75) $x = 0, 3$

78) $-6x^3 + 15x^2 - 30x + 59 - \frac{112}{x+2}$

80) 2, $(x+1)$, and $(x+2)$

82) $20\sqrt[3]{3} - 6\sqrt[3]{2}$

84) $10x^2\sqrt{5x} + 8\sqrt{5x}$

86) $5x^2y^2\sqrt{3xy}$

88) -0.00521 degrees per foot

91) $b = 113$

93) $x = -2/3$

96) -1

99) -15

101) $5i$

103) $\frac{13}{25} - \frac{41}{25}i$

105) $2i\sqrt{6} + 7i\sqrt{2}$

107) $x = \pm 3, \pm 2i$

110) 5 hr

112) rowing at 55 ft/min
water at 5 ft/min