

College Algebra Exam 2 Forms A, B Dr. Rapalje

COLLEGE ALGEBRA EXAM 2 **A** R¹ NAME _____

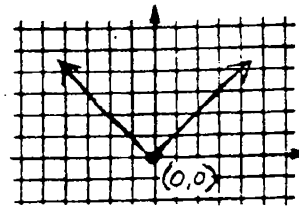
SHOW ALL WORK ON THIS TEST OR ON SEPARATE PAPER. Circle answers.
TURN IN ALL WORKSHEETS. CALCULATORS ARE PERMITTED ON THIS TEST.

1. Given the points $(-4, 3)$ and $(2, -1)$, find:
 a) slope b) distance c) midpoint

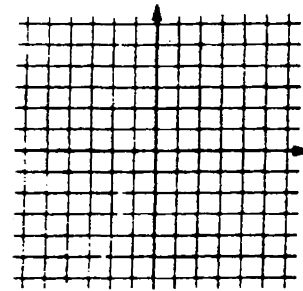
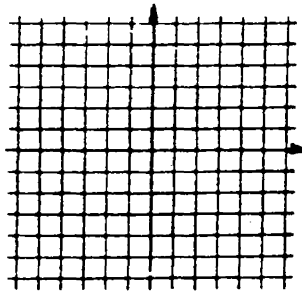
ea)

2. Find the equation (in *slope intercept* form) of a line passing through $(-4, 6)$ that is perpendicular to $3X - 5Y = 10$.

3. Given the graph of $Y = |X|$

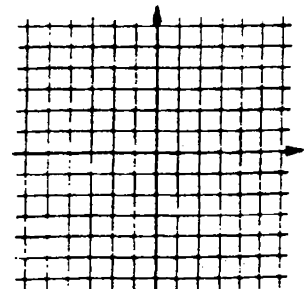
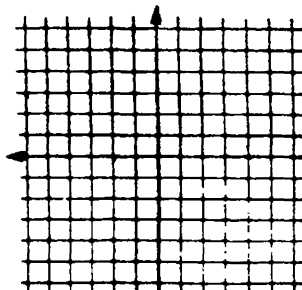


- a) $Y = |X + 3|$ b) $Y = -|X| + 4$



4. Find the vertex by completing the square. Sketch the graph.
 $X = 2Y^2 - 12Y - 5$
5. Find the center and radius by completing the square. Sketch.
 $X^2 + Y^2 - 8X + 10Y + 32 = 0$

(7)



6. Let $f(X) = \frac{3X - 4}{X + 2}$

a) $f(-3) =$

7. Let $f(X) = \frac{3X - 4}{2X}$ and $g(X) = X^2 - 4X$

a) find $f[g(X)]$

b) find $g[f(X)]$

(3 ea)

b) $f(-2) =$

(8)

c) $f(5X-7) =$

8. Find the domain (give interval notation when appropriate):

a) $Y = \frac{X - 4}{X^2 + 3X - 10}$

b) $Y = \sqrt{X^2 - 16}$

c) $Y = X^2 - 4$

d) $Y = \frac{X - 6}{\sqrt{3 - X}}$

(3 ea)

9. Given $4Y = XY + 12$

a) Domain:

b) Range:

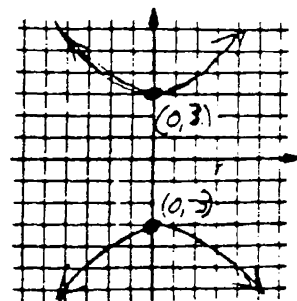
c) Function?

10. Given:

a) Domain:

b) Range:

c) Function?



(3 ea)

11. Show by finding $f[f^{-1}(x)]$ only that f and f^{-1} are inverses.

$$f(x) = \frac{x-4}{x} \quad \text{and} \quad f^{-1}(x) = \frac{4}{1-x}$$

(7)

12. Given $f(x) = \frac{3x-4}{2x}$, find $f^{-1}(x)$.

(7)

COLLEGE ALGEBRA EXAM 2A Solutions

1. $(-4, 3)$ $(2, -1)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-1 - 3}{2 - (-4)} = \frac{-4}{6} = -\frac{2}{3}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{6^2 + 4^2} = \sqrt{52} = 2\sqrt{13}$$

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{-4 + 2}{2}, \frac{3 + (-1)}{2}\right) = \left(\frac{-2}{2}, \frac{2}{2}\right) = (-1, 1)$$

2. $3x - 5y = 10$ (x, y)
 $(-4, 6)$
 $-5y = -3x + 10$
 $y = \frac{3}{5}x - 2$
 $6 = \left(\frac{3}{5}\right)(-4) + b$
 $3 \cdot 6 = \frac{3}{5}(-4) + 5b$
 $18 = -\frac{12}{5} + 5b$
 $18 + \frac{12}{5} = 5b$
 $96 + 12 = 25b$
 $108 = 25b$
 $b = \frac{108}{25}$
 $y = \frac{3}{5}x - 2$

3a) $y = |x+3|$
Left 3

b) $y = -|x| + 4$
Invert, up 4

4. $x = 2y^2 - 12y - 5$
 $x = 2(y^2 - 6y) - 5$
 $x + 18 = 2(y^2 - 6y + 9) - 5$
 $x + 23 = 2(y - 3)^2$
 Parabola Opens Right
 V(-23, 3)

5. $x^2 + y^2 - 8x + 10y + 32 = 0$
 $x^2 - 8x + y^2 + 10y = -32$
 $x^2 - 8x + 16 + y^2 + 10y + 25 = -32 + 16 + 25$
 $(x - 4)^2 + (y + 5)^2 = 9$
 Circle Center (4, -5)
 r = 3

6. $f(x) = \frac{3x-4}{x+2}$

a) $f(-3) = \frac{3(-3)-4}{-3+2} = \frac{-9-4}{-1} = 13$

b) $f(-2) = \frac{3(-2)-4}{-2+2} = \frac{-6-4}{0} = \text{undef.}$

c) $f(5x-7) = \frac{3(5x-7)-4}{5x-7+2} = \frac{15x-25}{5x-5} = \frac{5(3x-5)}{5(x-1)} = \frac{3x-5}{x-1}$

7. $f(x) = \frac{3x-4}{2x}$ $g(x) = (x^2-4x)$

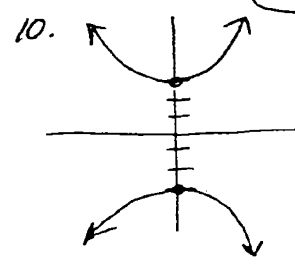
a) $f[g(x)] = \frac{3(x^2-4x)-4}{2(x^2-4x)} = \frac{3x^2-12x-4}{2x(x-4)}$

b) $g[f(x)] = (x^2-4x)\left(\frac{3x-4}{2x}\right) = \frac{x^2-4x}{4x^2} \cdot \frac{4(3x-4)2x}{2x \cdot 2x} = \frac{9x^2-24x+16-24x^2+32x}{4x^2} = \frac{-15x^2+8x+16}{4x^2}$

8a) $y = \frac{x-4}{x^2+3x-10}$
 $D: x^2+3x-10 \neq 0$
 $(x+5)(x-2) \neq 0$
 $\text{all } x \neq -5 \text{ } x \neq 2$

b) $y = \sqrt{x^2-16}$
 $D: x^2-16 \geq 0$ EXTR.
 $(-\infty, -4] \cup [4, \infty)$

9. $4y = xy + 12$
 a) D: Solve for y.
 $4y - xy = 12$
 $y(4-x) = 12$
 $y = \frac{12}{4-x}$
 $D: \text{all } x \neq 4$



11. $f(x) = \frac{x-4}{x}$
 $f^{-1}(x) = \frac{4}{1-x}$

$f[f^{-1}(x)] = \frac{\left(\frac{4}{1-x}\right) - 4}{\left(\frac{4}{1-x}\right)}$

b) R: Solve for X
 $4y - 12 = xy$
 $x = \frac{4y-12}{y}$
 $R: \text{all } y \neq 0$

a) D: $(-\infty, \infty)$
 b) R: $(-\infty, -3] \cup [3, \infty)$
 c) Function? No.

$= \frac{\left(\frac{4}{1-x}\right) - 4}{\left(\frac{4}{1-x}\right)}$

c) $y = \frac{12}{4-x}$
 Yes, is a function.

$= \frac{(1-x)\left[\left(\frac{4}{1-x}\right) - 4\right]}{(1-x)\left[\left(\frac{4}{1-x}\right)\right]} = \frac{4 - 4(1-x)}{4} = \frac{4 - 4 + 4x}{4} = \frac{4x}{4} = x$

c) $y = x^2 - 4$ All Reals
 $D: (-\infty, \infty)$

d) $y = \frac{x-6}{\sqrt{3-x}}$ $3-x > 0$
 $-x > -3$
 $D: (-\infty, 3)$ $x < 3$

12. $f(x) = y = \frac{3x-4}{2x}$
 $f^{-1}(x) = x = \frac{3y-4}{2y}$
 $2xy = 3y - 4$
 $4 = 3y - 2xy$
 $4 = y(3-2x)$
 $y = f^{-1}(x) = \frac{4}{3-2x}$

Show all work on this test or on separate paper.
Calculators are permitted, but not required.
TURN IN ALL WORKSHEETS!

1. Given $(-6, 5)$ $(2, -3)$

a) Distance =
(Simplest radical form!)

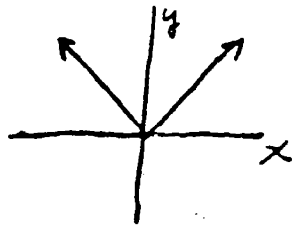
2. Find the equation of the line passing through $(-5, 6)$ perpendicular to $3x + 4y = -12$.

(3ea) b) Slope =

(8)

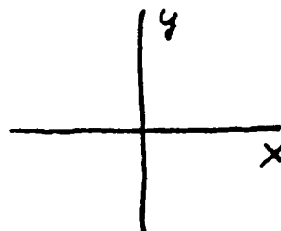
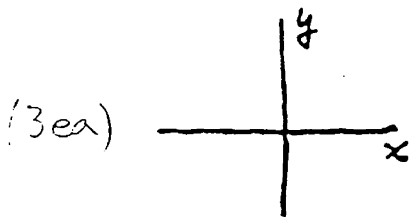
c) Midpoint =

3. Given $y = |x|$



4. Complete the square to find the vertex and sketch the graph:
 $y = -x^2 - 4x + 2$

a) Graph $y = |x+3|$ b) $y = -|x| + 2$



(3ea)

(8)

5. Complete the square to find center and radius of
 $x^2 + y^2 + 8x - 6y + 21 = 0$

(8)

6. Find the equation of the circle with center at $(2, -3)$ that passes through $(5, 4)$

(8)

7. Find the domain

a) $y = \frac{4-x}{x^2-2x-3}$

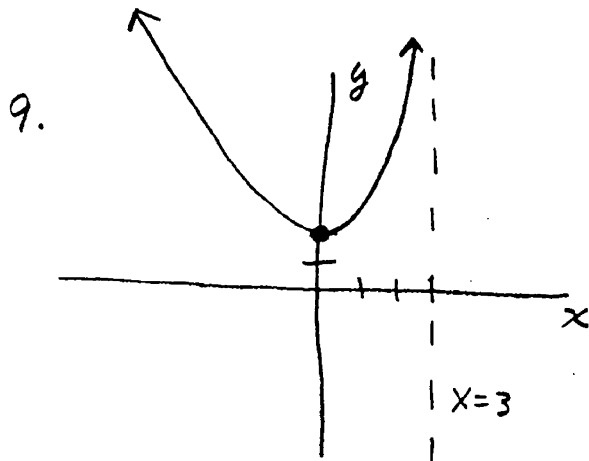
(4) a) Domain:

2a) b) $y = x^2-2x-3$

(4) b) Range:

c) $y = \sqrt{x^2-2x-3}$

(2) c) Is it a function?



10. If $f(x) = \frac{x+3}{x}$ and $g(x) = 2x-3$ find $f \circ g$ and $g \circ f$ and simplify.

(8)

(3ea)

Domain: _____

Range: _____

Is it a function? _____

$$11. \text{ If } f(x) = \begin{cases} x+3 & \text{if } x < 0 \\ 4 & \text{if } x = 0 \\ 2x-4 & \text{if } x > 0 \end{cases}$$

a) $f(2) =$

3ea) b) $f(0) =$

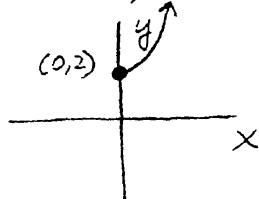
c) $f(-2) =$

(8)

$$12. \text{ If } f(x) = \frac{x+3}{x}, \text{ find } f^{-1}(x).$$

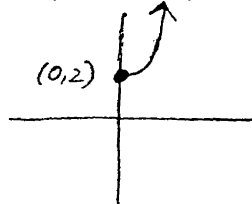
13. Draw the graph that is symmetric to :

a) y-axis

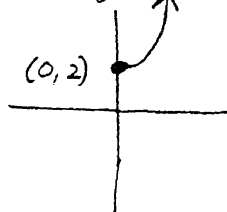


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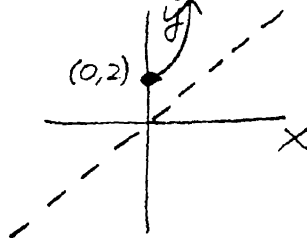
b) x-axis



c) Origin



d) Line $y = x$



COLLEGE ALG. EXAM 2B Solutions

1. $(-6, 5) (2, -3)$

a) $d = \sqrt{8^2 + 8^2} = \sqrt{128} = 8\sqrt{2}$

b) $m = \frac{5 - (-3)}{-6 - 2} = -1$

c) mid = $(\frac{-6+2}{2}, \frac{5-3}{2}) = (-2, 1)$

2. $3x + 4y = -12$

$y = -\frac{3}{4}x - 3$

$m = -\frac{3}{4} \quad m_{\perp} = \frac{4}{3}$

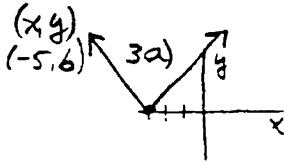
$y = m x + b$

$6 = (\frac{4}{3})(-5) + b$

$6 = -\frac{20}{3} + b$

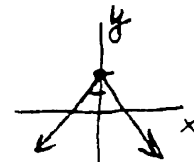
$18 = -20 + 3b$

$b = \frac{38}{3} \quad y = \frac{4}{3}x + \frac{38}{3}$



$y = |x+3|$
(Left 3)

b)



$y = -|x| + 2$
(Invert, up 2)

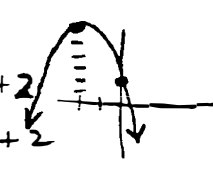
4. $y = -x^2 - 4x + 2$

$y = -(x^2 + 4x) + 2$

$y - 4 = -(x^2 + 4x + 4) + 2$

$y - 6 = -(x+2)^2$

$V(-2, 6)$



5. $x^2 + 8x + y^2 - 6y = -21$

$x^2 + 8x + 16 + y^2 - 6y + 9 = -21 + 16 + 9$

$(x+4)^2 + (y-3)^2 = 4$

$C(-4, 3), r=2$

6. $C(2, -3)$ through $(5, 4)$

$r = \sqrt{3^2 + 7^2} = \sqrt{58}$

$(x-2)^2 + (y+3)^2 = 58$

7a) $y = \frac{4-x}{x^2-2x-3}$

a) $y = x^2 - 2x - 3$

$x^2 - 2x - 3 \neq 0$

$(x-3)(x+1) \neq 0$

$x \neq 3, -1$

All reals on $(-\infty, \infty)$

8. $xy = 4y + 4$

a) Domain (Solve for y) b) Range (Solve for x)

$xy - 4y = 4$

$y(x-4) = 4$

$y = \frac{4}{x-4}$

$x = \frac{4y+4}{y}$

$R: \text{all } y \neq 0$

$D: \text{all } x \neq 4$

Is a function Yes

9a) $D: (-\infty, 3)$

10. $f(x) = \frac{x+3}{x} \quad g(x) = 2x-3$

11. $f(x) = \begin{cases} x+3 & x < 0 \\ 4 & x = 0 \\ 2x-4 & x > 0 \end{cases}$

b) $R: [2, \infty)$

c) Yes

$f \circ g = \frac{(\quad)+3}{(\quad)}$

$g \circ f = 2(\quad) - 3$

a) $f(2) = 2(2) - 4 = 0$

b) $f(0) = 4$

c) $f(f(2)) = -2 + 3 = 1$

$f(f(2)) = -2 + 3 = 1$

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12. $f(x) = \frac{x+3}{x}$

$y = \frac{x+3}{x}$

Interchange:

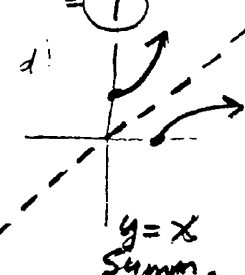
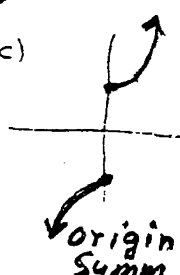
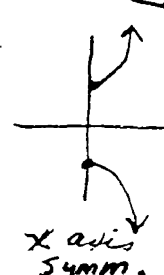
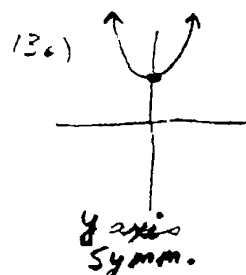
$x = \frac{y+3}{y}$

$xy = y + 3$

$xy - y = 3$

$y(x-1) = 3$

$f^{-1}(x) = y = \frac{3}{x-1}$



Dr. Robert J. Rapalje

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ANSWERS TO ALL EXERCISES ARE INCLUDED AT THE END OF THIS PAGE