

Name: _____

MATH 1050 - Exam 1 (Released) - Fall 2012

- Neatly write your solutions directly on the exam paper. If a solution requires more space than given, you may continue on the back of the page. Work on scratch paper will not be graded.
- *To receive full credit you must show all necessary work and provide clear explanations.*
- Books, notes, calculators with symbolic manipulation features, computers, cell phones, or other internet enabled devices are not allowed.

1. Find the real solutions of each equation:

(a) $x(2x - 3) = (x - 1)(2x + 1)$

(b) $\frac{1}{x} + \frac{x}{x-1} = \frac{1}{x(x-1)}$

(c) $\sqrt[3]{4x+2} = -2$

2. Solve each equation in the complex number system:

(a) $3x^2 - 2x + 3 = 0$

(b) $x^4 - 3x^2 - 4 = 0$

3. Find the intercepts for the equation $3x^2 - 8x + y + 4 = 0$.

4. Test $x = \frac{y^4}{y^2 + 9}$ for symmetry with respect to the y -axis, x -axis, and the origin.

5. Find the equation of the line that goes through the point $(1, -3)$ and is *parallel* to the line $2x - 6y = 18$.

6. Write the circle $x^2 + y^2 - 2x + 8y + 1 = 0$ in standard form.

7. Find the domain of the function $f(x) = \frac{\sqrt{x}}{x-3}$.

8. Solve the equation $|2x - 1| = 3$.

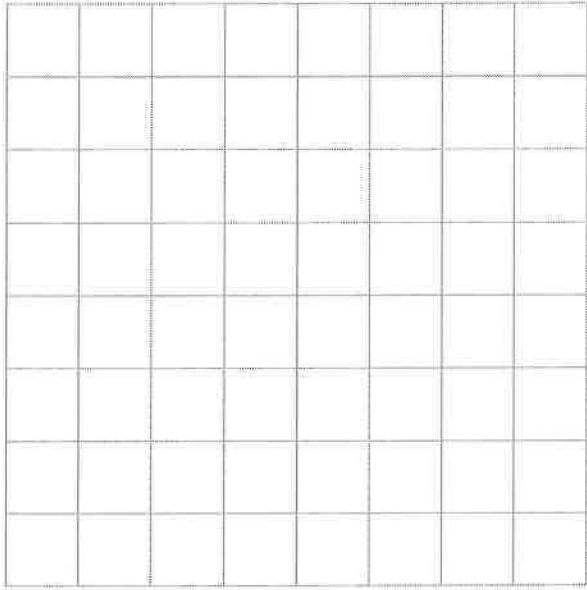
9. For the functions $f(x) = \sqrt{3x}$ and $g(x) = 3x - x^2$ evaluate the following:

(a) $(f + g)(x)$

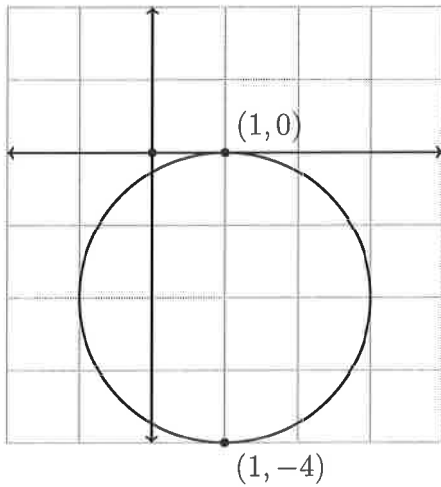
(b) $(f \cdot g)(3)$

(c) $g(-x)$

10. Graph the line $y = -\frac{2}{5}x + 2$.



11. Find the equation of the circle whose graph is below. You may leave your answer in standard form or general form.



12. Solve the inequality $\frac{x}{3} \geq 1 - \frac{x}{6}$. Write your answer in interval notation and graph your solution.

Name: Key when writing solution if $x = \text{some \#}'s$ $\{ \# 's, \# 's \}$

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write inequalities or domain restrictions in set builder

- Neatly write your solutions directly on the exam paper. If a solution requires more space than given, you may continue on the back of the page. Work on scratch paper will not be graded. *Notation*
- To receive full credit you must show all necessary work and provide clear explanations. *ex: $\{x | x \geq 5 \text{ and } x = 1\}$ or $D: \{x | x \leq 0 \text{ and } x \neq 1\}$*
- Books, notes, calculators with symbolic manipulation features, computers, cell phones, or other internet enabled devices are not allowed.

1. Find the real solutions of each equation:

(a) $x(2x - 3) = (x - 1)(2x + 1)$

$$\cancel{2x^2} - 3x = \cancel{2x^2} - x - 1$$

$$\frac{-2x}{-2} = \frac{-1}{-2}$$

$$x = \frac{1}{2}$$

$$\boxed{\left\{ \frac{1}{2} \right\}}$$

(b) $\frac{1}{x} + \frac{x}{x-1} = \frac{1}{x(x-1)}$ *Domain issues*
 $x \neq 0$ $x-1 \neq 0$ $x \neq 1$
 $D: \{x | x \neq 0, 1\}$

Dump the denominator

$$x-1 + x^2 = 1$$

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

$$(x+2)(x-1) = 0$$

$$x = -2, 1$$

$$\boxed{\{-2\}}$$

can't be 1 because of Domain restriction

(c) $(\sqrt[3]{4x+2})^3 = (-2)^3$

$$4x+2 = -8$$

$$\frac{4x}{4} = \frac{-10}{4}$$

$$x = -\frac{5}{2}$$

$$\boxed{\left\{ -\frac{5}{2} \right\}}$$

← imaginary #'s; to solve use quadratic formula if needed

2. Solve each equation in the complex number system:

(a) $3x^2 - 2x + 3 = 0$ $a=3$ $b=-2$ $c=3$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{2 \pm \sqrt{(-2)^2 - 4(3)(3)}}{2(3)}$$

$$x = \frac{2 \pm \sqrt{4 - 36}}{6}$$

$$x = \frac{2 \pm \sqrt{-32}}{6}$$

To simplify radicals
 $\sqrt{32}i = \sqrt{16 \cdot 2}i = 4\sqrt{2}i$

$$x = \frac{2 \pm 4\sqrt{2}i}{6} = \frac{1 \pm 2\sqrt{2}i}{3}$$

$$\left\{ \frac{1 \pm 2\sqrt{2}i}{3} \right\}$$

(b) $x^4 - 3x^2 - 4 = 0$
 use u substitution
 let $u = x^2$ $u^2 - 3u - 4 = 0$
 so $u^2 = x^4$ $(u+1)(u-4) = 0$
 $u = -1, 4$
 now replace u with x^2 since $u = x^2$
 $\sqrt{x^2} = -1$ $\sqrt{x^2} = 4$
 $x = \pm i$ $x = \pm 2$

$$\left\{ \pm 2, \pm i \right\}$$

3. Find the intercepts for the equation $3x^2 - 8x + y + 4 = 0$.

x intercepts
 let $y=0$
 $3x^2 - 8x + 0 + 4 = 0$
 $3x^2 - 8x + 4 = 0$ factors of 3·4 that equal -8 when added

| |
|-----|
| 12 |
| 3 4 |
| 2 6 |

$$(3x - 2)(3x - 6) = 0$$

Factor out GCF

$$(3x - 2)3(x - 2) = 0$$

$$(3x - 2)(x - 2) = 0$$

$$x = \frac{2}{3}, x = 2$$

$$\left(\frac{2}{3}, 0 \right), (2, 0) \text{ x intercepts}$$

y intercepts
 let $x=0$
 $3(0)^2 - 8(0) + y + 4 = 0$
 $y + 4 = 0$
 $y = -4$

$$(0, -4) \text{ y intercept}$$

4. Test $x = \frac{y^4}{y^2+9}$ for symmetry with respect to the y -axis, x -axis, and the origin.

| X-axis $(x,y) \rightarrow (x,-y)$ $x = \frac{(-y)^4}{(-y)^2+9}$ $x = \frac{y^4}{y^2+9}$ since its the same as original equation its | Y-axis $(x,y) \rightarrow (-x,y)$ $(-x) = \frac{y^4}{y^2+9}$ $x = -\frac{y^4}{y^2+9}$ since they are not the same | origin $(x,y) \rightarrow (-x,-y)$ $(-x) = \frac{(-y)^4}{(-y)^2+9}$ $-x = \frac{y^4}{y^2+9}$ $x = -\frac{y^4}{y^2+9}$ |
|--|--|---|
| Symmetric w/ Respect to X-axis | Not Symmetric to Y-axis | Not Symmetric to origin |

5. Find the equation of the line that goes through the point $(1, -3)$ and is parallel to the line $2x - 6y = 18$.
 Find slope \uparrow
 $\frac{-6y}{-6} = \frac{-2x+18}{-6}$
 $y = \frac{1}{3}x - 3$
 $m = \frac{1}{3}$ Now plug in Point & slope

$(y-3) = \frac{1}{3}(x-1)$
 $y+3 = \frac{1}{3}x - \frac{1}{3} - \frac{3 \cdot 3}{1 \cdot 3}$
 $y = \frac{1}{3}x - \frac{10}{3}$

same slope different b's

6. Write the circle $x^2 + y^2 - 2x + 8y + 1 = 0$ in standard form.

$x^2 - 2x + (\frac{-2}{2})^2 + y^2 + 8y + (\frac{8}{2})^2 = -1 + (\frac{-2}{2})^2 + (\frac{8}{2})^2$ complete the square!
 $(x-1)^2 + (y+4)^2 = -1 + 1 + 16$

$(x-1)^2 + (y+4)^2 = 16$
 Center: $(1, -4)$
 Radius = 4

7. Find the domain of the function $f(x) = \frac{\sqrt{x}}{x-3}$.

Domain Issues
 ✓ Denominator
 ✓ radical

Denominator issue

radical issue

$$x-3 \neq 0$$

$$\begin{matrix} +3 & +3 \end{matrix}$$

$$x \geq 0$$

$$x \neq 3$$

$$D: \{x \mid x \geq 0 \text{ and } x \neq 3\}$$

8. Solve the equation $|2x - 1| = 3$. remember that whenever you have an absolute value you'll set up two equations & get two answers

$$2x - 1 = 3$$

$$\begin{matrix} +1 & +1 \end{matrix}$$

$$\frac{2x}{2} = \frac{4}{2}$$

$$x = 2$$

$$2x - 1 = -3$$

$$\begin{matrix} +1 & +1 \end{matrix}$$

$$\frac{2x}{2} = \frac{-2}{2}$$

$$x = -1$$

$$\{-1, 2\}$$

9. For the functions $f(x) = \sqrt{3x}$ and $g(x) = 3x - x^2$ evaluate the following:

(a) $(f + g)(x) = f(x) + g(x) = (\sqrt{3x}) + (3x - x^2)$

$$(f+g)(x) = -x^2 + 3x + \sqrt{3x}$$

(b) $(f \cdot g)(3) = f(3) \cdot g(3) = (\sqrt{3(3)}) (3(3) - (3)^2)$
 $= \sqrt{9}(9-9)$
 $= 3(0)$
 $= 0$

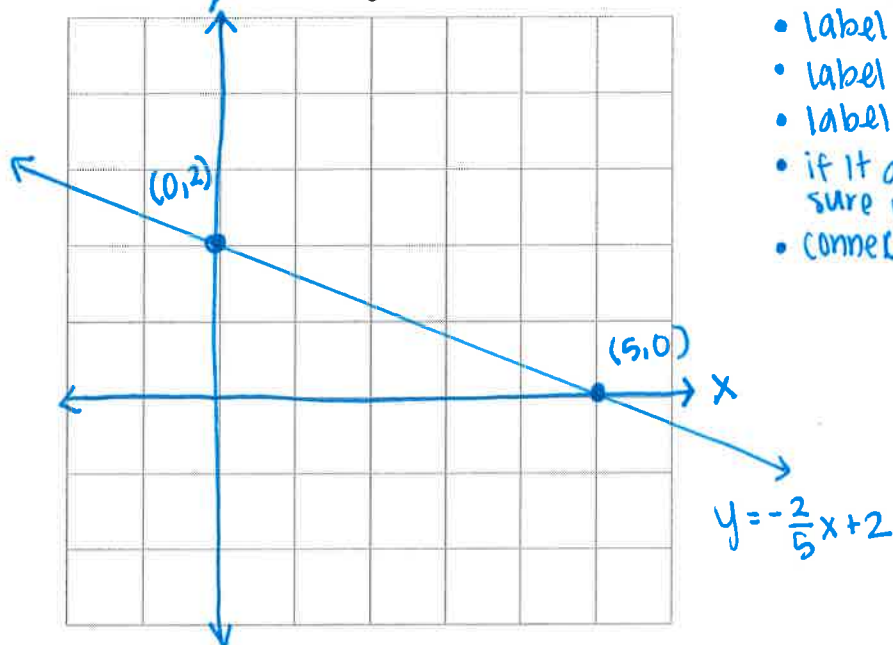
$$(f \cdot g)(3) = 0$$

(c) $g(-x)$

$$g(-x) = 3(-x) - (-x)^2 = -3x - x^2$$

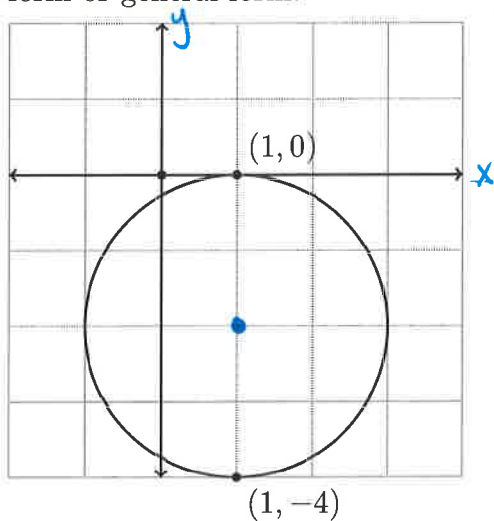
$$g(-x) = -x^2 - 3x$$

10. Graph the line $y = -\frac{2}{5}x + 2$.



- When graphing you must make sure you
- label x & y axis
 - label points
 - label the function of the graph
 - if it asks for x & y intercepts make sure you find the exact values Not "ish's"
 - connect pts w/a straight edge

11. Find the equation of the circle whose graph is below. You may leave your answer in standard form or general form.



radius is half the diameter diameter is equal to
Center: (1, -2) the distance between my points

$$(x-1)^2 + (y+2)^2 = 4 \quad r=2$$

Center (1, -2) radius: 2

12. Solve the inequality $\frac{x}{3} \geq 1 - \frac{x}{6}$. Write your answer in interval notation and graph your solution.

$$\begin{aligned} \frac{x}{3} &\geq 1 - \frac{x}{6} \\ 2x &\geq 6 - x \\ +x & \quad +x \\ 3x &\geq 6 \\ \frac{3x}{3} &\geq \frac{6}{3} \\ x &\geq 2 \end{aligned}$$

$\{x | x \geq 2\}$
set builder notation

