

College Algebra

Test 2

Form A

Spring 2015

Name: _____

Date: _____

READ THESE INSTRUCTIONS CAREFULLY!

- Circle or underline your final written answer.
- Justify your reasoning and show your work.
- If you run out of space, make a note and continue your work on the back of a page.

Algebra Facts

Quadratic Formula

If a , b , and c are real numbers and $a \neq 0$, then the solutions of the equation $ax^2 + bx + c = 0$ are

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

Absolute Value

- If $|E| = F$, then either $E = F$ or $E = -F$.
- If $|E| \leq F$, then both $E \leq F$ and $E \geq -F$.
- If $|E| \geq F$, then either $E \geq F$ or $E \leq -F$.

Geometry Formulas

Given points (x_1, y_1) and (x_2, y_2) , the distance between them is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2},$$

their midpoint is

$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right),$$

and the slope between them is

$$\frac{y_2 - y_1}{x_2 - x_1}.$$

Circles

The circle having center (h, k) and radius r is given by the equation

$$(x - h)^2 + (y - k)^2 = r^2$$

Lines

The standard form equation of a line looks like

$$ax + by + c = 0,$$

where a , b , and c are constants. The slope-intercept form is

$$y = mx + b,$$

where m is the slope of the line and b the y -intercept. The point-slope form is

$$y - y_0 = m(x - x_0),$$

where m is the slope and (x_0, y_0) is any point on the line.

Parabolas

The parabola with horizontal directrix, vertex at (h, k) , and signed focal length p is given by the equation

$$y = \frac{1}{4p}(x - h)^2 + k.$$

This parabola opens up if $p > 0$ and down if $p < 0$.

Ellipses

The ellipse with foci at $(\pm c, 0)$ and major axis $2a$ is given by the equation

$$\left(\frac{x}{a} \right)^2 + \left(\frac{y}{b} \right)^2 = 1$$

where $b^2 = c^2 - a^2$.

Transformations

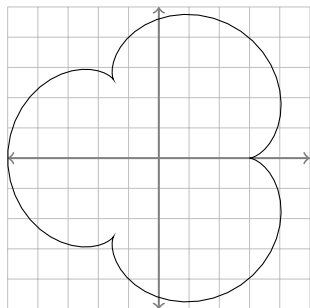
$$\begin{array}{lll} x & \mapsto & x - h & \text{Horizontal Shift} \\ y & \mapsto & y - k & \text{Vertical Shift} \end{array}$$

$$x \mapsto \frac{1}{a}x \quad \text{Horizontal Stretch}$$

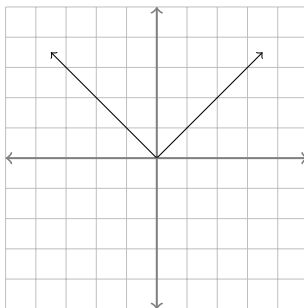
$$y \mapsto \frac{1}{b}y \quad \text{Vertical Stretch}$$

1. (10 pts.) Find an equation for the circle centered at $(5, -5)$ and having radius 2.

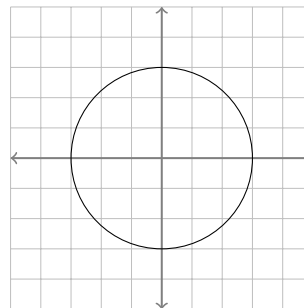
2. (10 pts.) Determine whether or not the following graphs are symmetric across the x -axis, across the y -axis, or about the origin.



x -axis: yes/no
 y -axis: yes/no
origin: yes/no



x -axis: yes/no
 y -axis: yes/no
origin: yes/no



x -axis: yes/no
 y -axis: yes/no
origin: yes/no

3. (10 pts.) Find the average rate of change of $f(x) = x^3 + 3x + 1$ from $x_1 = 1$ to $x_2 = 2$.

4. (10 pts.) Find an equation for the line passing through the point $(2, 3)$ and having slope $-1/3$.

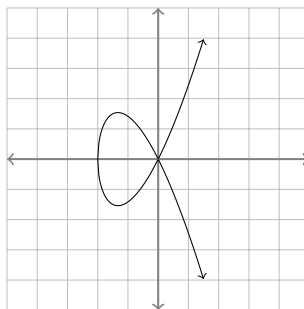
5. (10 pts.) Solve the following system of equations.

$$\begin{cases} -2y - x = 10 \\ -4y - 3x = 1 \end{cases}$$

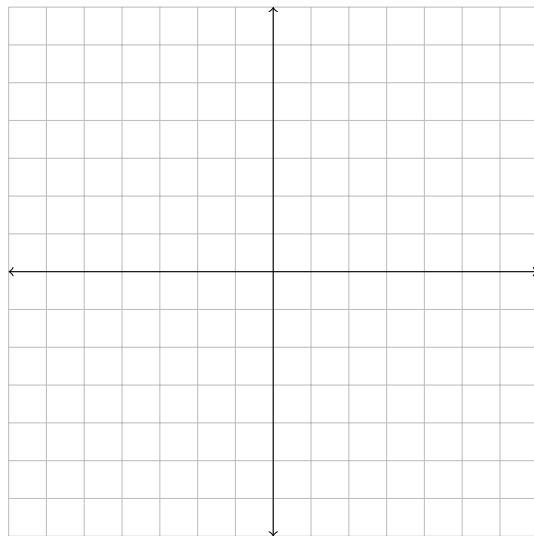
6. (10 pts.) Find an equation for the circle centered at $(4, 6)$ and passing through $(-5, -7)$.

7. (10 pts.) Graphically transform the following graph in the space provided.

Shift left by 3 unit(s) and shift up by 2 unit(s).



8. (10 pts.) Plot the graph of the linear equation $y = \frac{-4}{5}x - 3$ on the plane below.



9. (10 pts.) Find the zeros of the following function: $f(x) = x^2 - 2x - 3$

10. (10 pts.) Determine whether or not the following equations are symmetric across the x -axis, across the y -axis, about the origin, or none of the three.

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

(b) $xy + y^2 = 2$

(c) $\frac{1}{x^2} + \frac{1}{y} = xy$

Bonus. (10 pts.) Solve the following system of equations. (Hint: Draw a picture.)

$$\begin{cases} (x-1)^2 + y^2 = 4 \\ (x+1)^2 + y^2 = 4 \end{cases}$$