

MATHEMATICS 201-009-50

Precalculus

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Fall 2007

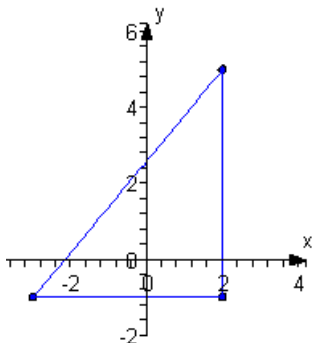
VI - Coordinate Geometry and Lines

- Sketch the polygon with the indicated vertices.
 - $A(2, -1)$, $B(2, 5)$ and $C(-3, -1)$
 - $A(-1, 3)$, $B(5, 3)$, $C(2, -2)$, $D(-4, -2)$
- For each pair of points,
 - find the distance between them
 - find the midpoint
 - $P(2, -5)$, $Q(4, 2)$
 - $P(-3, -4)$, $Q(1, -7)$
 - $P(4, -3)$, $Q(2, -3)$
 - $P(1, 4)$, $Q(1, -4)$
- Make a table of values and sketch the graph of the equation. Find the x and y -intercepts, and test for symmetry.
 - $y = x + 2$
 - $2x + 3y = 6$
 - $y = 1 - x^2$
 - $y = \sqrt{x}$
 - $x + y^2 = 4$
 - $y = x^3$
 - $y = |x| - 3$
 - $y = |x + 2|$
- Find the x and y -intercepts of the equation, and test for symmetry.
 - $4x - 2y = 3$
 - $y = x^2 - 3x - 10$
 - $y = \frac{x^2 - 1}{x^2 + 1}$
 - $x^2 - y^2 = 25$
 - $y = \frac{1}{x}$
 - $y = \frac{x}{x^2 + 4}$
- Find the equation of the circle in standard form that satisfies the given conditions, and graph the circle.
 - Center $(3, -4)$ and radius 2
 - Center $(2, 0)$ and radius 3
 - Center at origin passing through $(5, -12)$
 - Endpoints of a diameter $P(2, -5)$ and $Q(-1, -1)$.
 - Center $(-3, 6)$ and tangent to the y -axis.

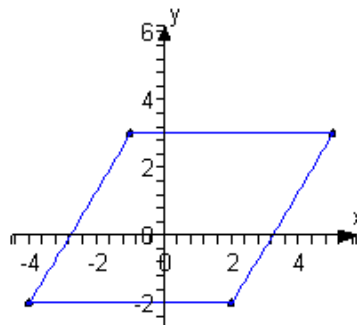
6. Find the center and radius of the circle given by the equation.
- a) $x^2 - 2x + y^2 + 2y - 14 = 0$ b) $x^2 + y^2 + 6x + 8y = 0$
c) $x^2 + y^2 - 10x + 16 = 0$ d) $9x^2 + 9y^2 - 18x + 4y = 1$
7. Find an equation of the line that satisfies the given conditions.
- a) Passing through $P(2, -3)$ and $Q(4, 5)$.
b) Passing through $P(-3, -4)$, $Q(1, -7)$.
c) Passing through $P(1, 2)$ and $Q(5, 2)$.
d) Passing through $P(1, 2)$ and $Q(1, -8)$
e) x -intercept 1 and y -intercept -3 .
f) Passing through $P(3, -4)$ and parallel to $x + 3y = 6$.
g) Passing through $P(3, -4)$ and perpendicular to $3x - 9y = 1$.
h) Passing through $P(1, 4)$ and parallel to the x -axis
i) Passing through $P(2, 3)$ and parallel to the line passing through $Q(1, 3)$ and $R(2, -5)$.
j) Passing through $P(3, -4)$ and perpendicular to the line passing through $Q(2, -1)$ and $R(-2, 1)$.
k) Passing through the midpoint of $P(2, -3)$ and $Q(8, 5)$ and perpendicular to the segment \overline{PQ} .
8. You are a contractor and have purchased a piece of equipment for \$26500. The equipment costs an average of \$5.25 per hour for fuel and maintenance, and the operator is paid \$9.50 per hour.
- a) Write a linear equation giving the total cost C of operating the equipment for t hours.
b) You charge customers \$25 per hour of machine use. Write an equation for the revenue R derived from t hours of use.
c) Use the formula for profit, $P = R - C$, to write an equation for the profit derived from t hours of use.
d) Find the number of hours you must operate the equipment before you break even (that is, when the profit is zero).
9. A company handles an apartment building with 50 units. Experience has shown that if the rent for each of the units is \$500 per month, all of the units will be filled, but one unit will become vacant for each \$20 increase. Find an equation for the price p of a unit as a function of the number of rented units x . This is referred to as the **demand function**.
10. A new employee at Math Corporation starts with a salary of \$50 000 per year, and increases by \$3 000 per year. Find the equation for the salary on an employee who has been working for t years. How long will it take someone to earn \$80 000 per year?

ANSWERS

1. a)



b)



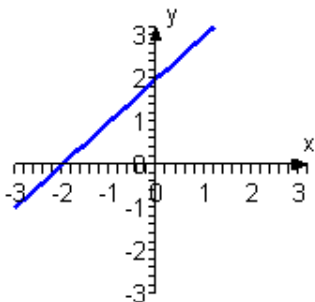
2. a) $d(P,Q) = \sqrt{53}$, $M(3, \frac{-3}{2})$

b) $d(P,Q) = 5$, $M(-1, \frac{-11}{2})$

c) $d(P,Q) = 2$, $M(3, -3)$

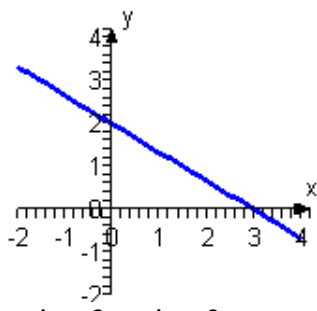
d) $d(P,Q) = 8$, $M(1, 0)$

3. a)



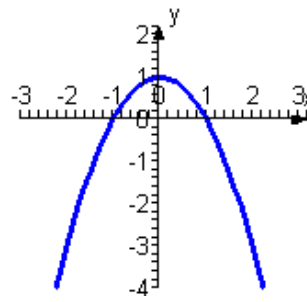
x-int: -2, y-int: 2
No symmetry

b)



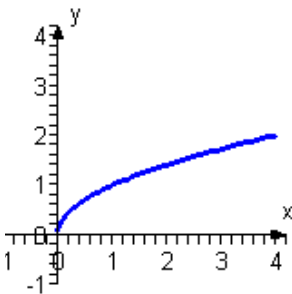
x-int: 3, y-int: 2
No symmetry

c)



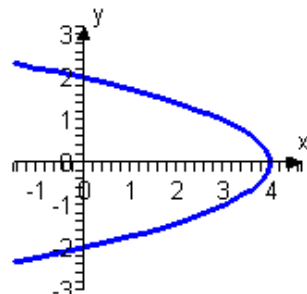
x-int: ± 1 , y-int: 1
Sym. about the y-axis

d)



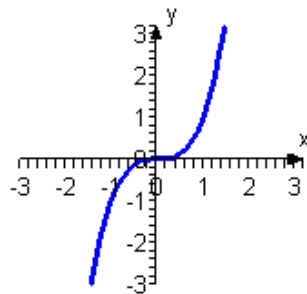
x-int: 0, y-int: 0
No symmetry

e)



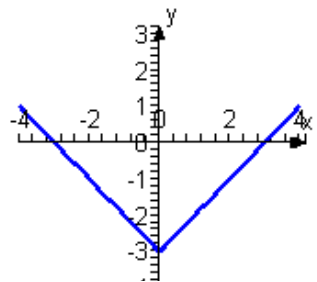
x-int: 4, y-int: ± 2
Sym. about the x-axis

f)



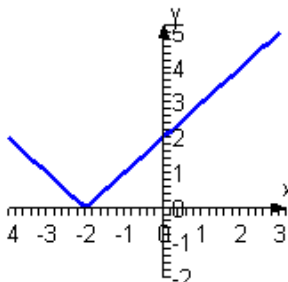
x-int: 0, y-int: 0
Sym. about the origin

g)



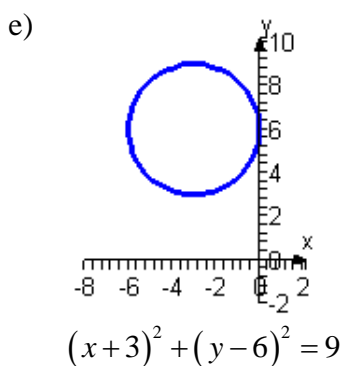
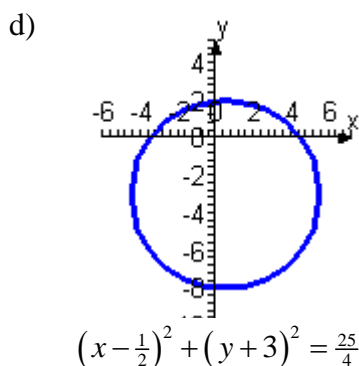
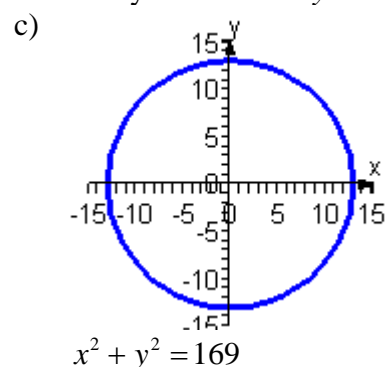
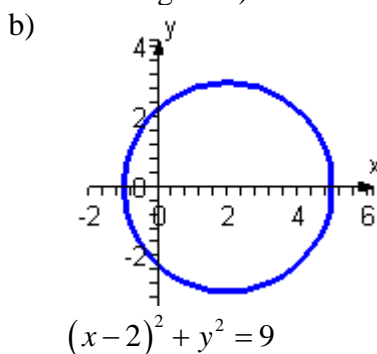
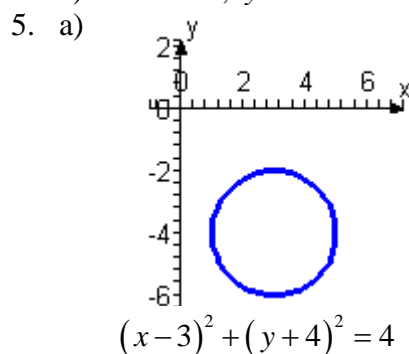
x-int: ± 3 , y-int: -3
Sym. about the y-axis

h)



x-int: -2, y-int: 2
No symmetry

4. a) x -int: $\frac{3}{4}$, y -int: $\frac{-3}{2}$ No symmetry b) x -int: 5, -2 y -int: -10 No symmetry
 c) x -int: ± 1 , y -int: -1 Sym. about the y -axis d) x -int: ± 5 y -int: none all 3 symmetries
 e) x -int: none, y -int: none Sym. about origin f) x -int: 0 y -int: 0 Sym. about the y -axis



6. a) Center: $(1, -1)$, radius = 4 b) Center: $(-3, -4)$, radius = 5
 c) Center: $(5, 0)$, radius = 3 d) Center: $(1, \frac{-2}{9})$, radius = $\frac{\sqrt{94}}{9}$
7. a) $y = 4x - 11$ b) $y = \frac{-3}{4}x - \frac{25}{4}$ c) $y = 2$ d) $x = 1$
 e) $y = 3x - 3$ f) $y = \frac{-1}{3}x - 3$ g) $y = -3x + 5$ h) $y = 4$
 i) $y = -8x + 19$ j) $y = 2x - 10$ k) $y = \frac{-3}{4}x + \frac{19}{4}$
8. a) $C = 14.75t + 26500$ b) $R = 25t$ c) $P = 10.25t - 26500$ d) ≈ 2585.37 hours
9. $p = -20x + 1500$
10. $S = 50000 + 3000t$ 10 years