

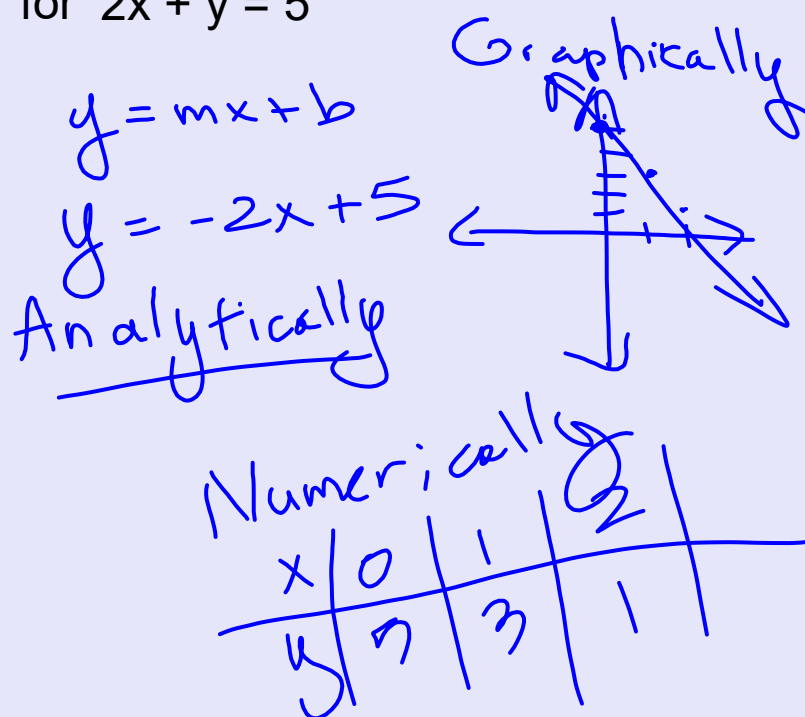
Calculus of a Single Variable Eighth Edition

Sep 7-8:59 AM



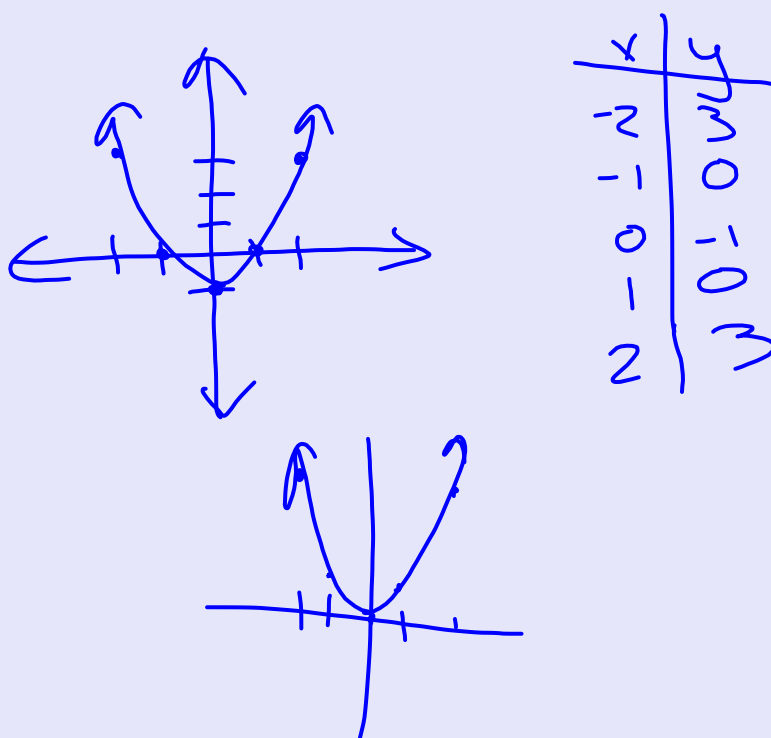
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Show every representation you can think of
for $2x + y = 5$



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Graph $y = x^2 - 1$



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Intercepts

y-int (where $x=0$) so $(0,b)$

x-int (where $y=0$) so $(a,0)$

Find the x- and y- intercepts of $y = x^3 - 7x^2$ and sketch a rough graph of the relation.

x-int.

$$0 = x^3 - 7x^2$$

$$0 = x^2(x - 7)$$

$$x = 7 \text{ or } x = 0$$

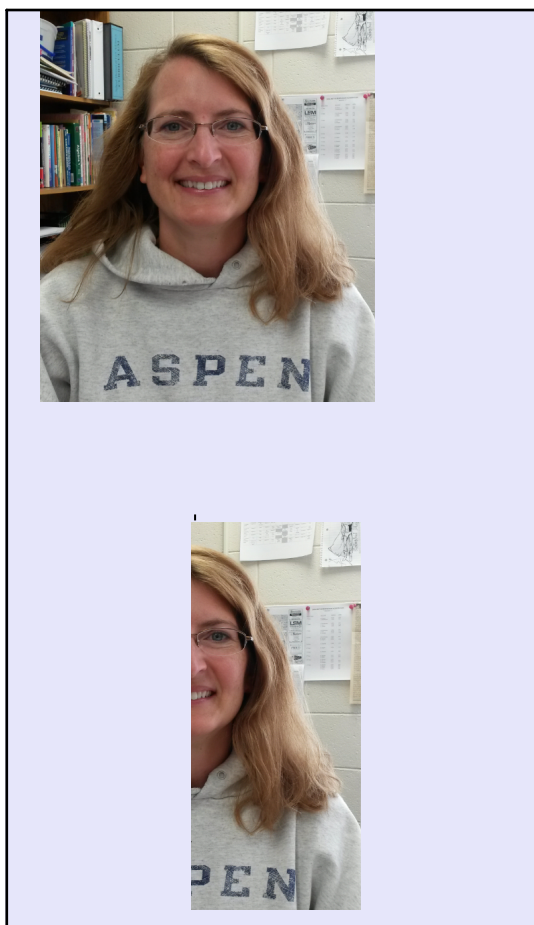
y-int

$$y = 0^3 - 7(0)^2$$

$$y = 0$$

What are they?
How do you find them? How could you sketch a graph using them?

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Symmetry

Three types.
how do you
test for them?

y-axis symmetry: If (x, y) and $(-x, y)$ are on the graph.

Test an eqn. for y-axis sym. by substituting $-x$ for x and simplifying. ex

$$\begin{aligned} y &= x^2 - 1 \\ y &= (-x)^2 - 1 \\ y &= x^2 - 1 \end{aligned}$$

x-axis symmetry: If (x, y) and $(x, -y)$ are on graph.

Test an eqn. for x-axis sym. by substituting $-y$ for y and simplifying.

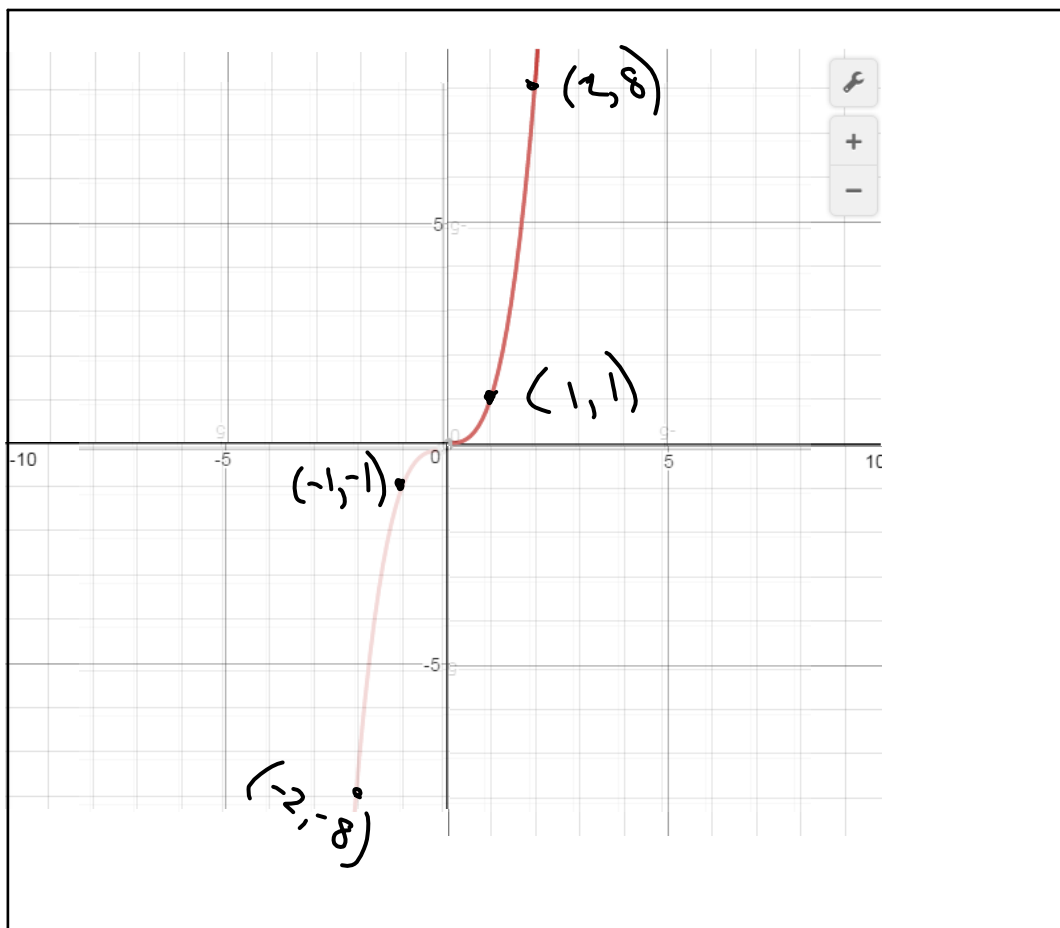
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What type of symmetry does the relation $y = 4x^2 + 8$ have? How do you know? How can you prove it?

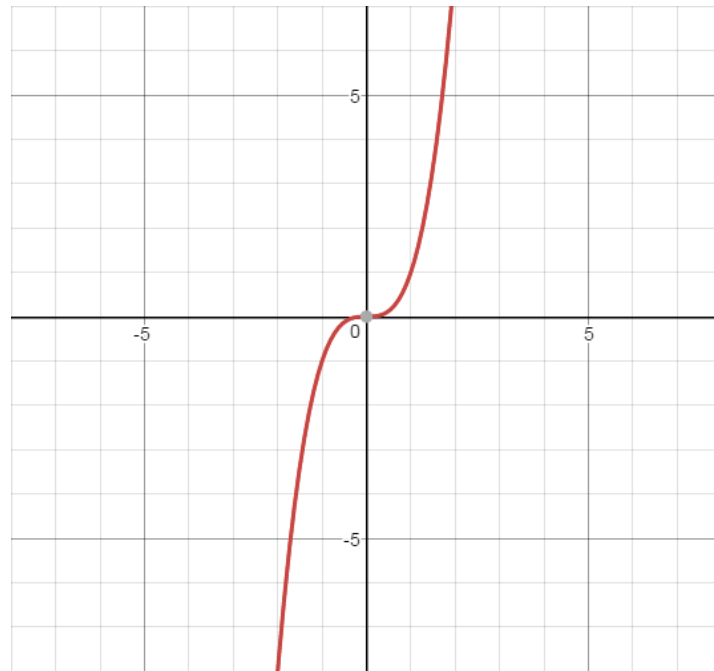
$$y = 4(-x)^2 + 8$$

$$y = 4x^2 + 8$$

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Symmetry w/ respect to the origin: If (x, y) and $(-x, -y)$ are on graph.

To test, replace $-x$ for x and $-y$ in for y , and see if you get an equivalent equation.

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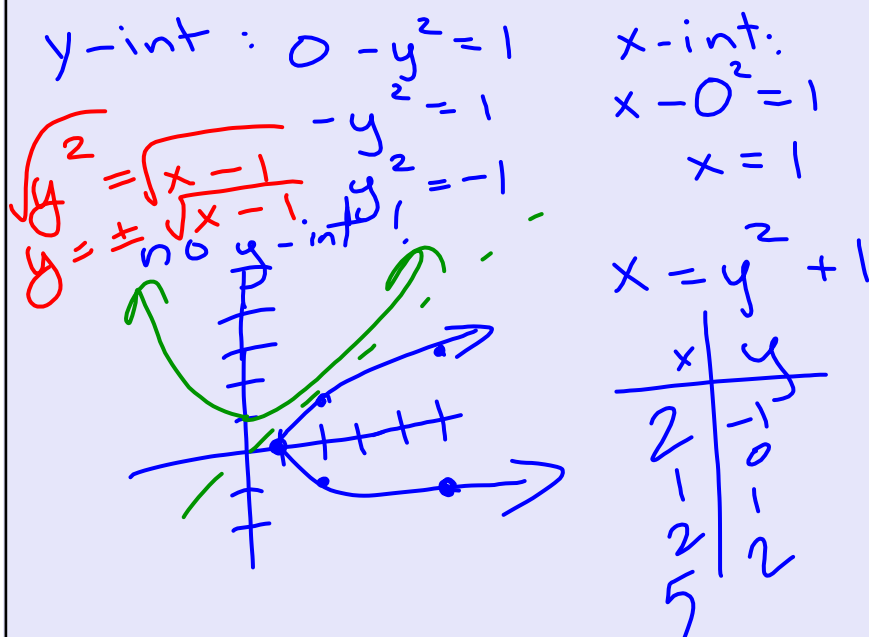
Prove that $y = 4x^3 - 2x + 3$ is symmetric with respect to the origin.

$$\begin{aligned}
 (-y) &= 4(-x)^3 - 2(-x) + 3 \\
 -y &= -4x^3 + 2x + 3 \\
 \hline
 -y &= -4x^3 + 2x + 3 \\
 y &= 4x^3 - 2x - 3
 \end{aligned}$$

NO

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Using intercepts, symmetry, and point-plotting, graph $x - y^2 = 1$ ↖ x-axis sym.



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Finding points of Intersection

$$x^2 + y^2 = 25$$

$$2x + y = 10$$

$$\begin{array}{r} 2x + y = 10 \\ -2x = -2x \\ \hline y = 10 - 2x \end{array}$$

$$x^2 + (10 - 2x)^2 = 25$$

$$x^2 + 100 - 40x + 4x^2 = 25$$

$$5x^2 - 40x + 75 = 0$$

$$5(x^2 - 8x + 15) = 0$$

$$5(x - 5)(x - 3) = 0$$

$$5(x - 5)(x - 3)$$

$$x = 5, 3$$

$$(5, 0) (9, 4)$$

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p. 8, #1-5, 7-13 odds, 16, 19-29 odds, 30, 45, 51, 61, 63, 65, 75, 81-84

In Exercises 1-4, match the equation with its graph. (Graphs are labeled (a), (b), (c), and (d).)

(a)

(b)

(c)

(d)

1. $y = -\frac{1}{2}x + 2$ 2. $y = \sqrt{9 - x^2}$
 3. $y = 4 - x^2$ 4. $y = x^3 - x$

In Exercises 5-14, sketch the graph of the equation by point plotting.

5. $y = \frac{1}{2}x + 1$ 16. $y = |x| + |x - 10|$
 7. $y = 4 - x^2$
 9. $y = |x + 2|$
 11. $y = \sqrt{x} - 4$
 13. $y = \frac{2}{x}$

In Exercises 15 and 16, describe the viewing window that yields the figure.

In Exercises 19-26, find any intercepts.

19. $y = x^2 + x - 2$ 21. $y = x^2 \sqrt{25 - x^2}$
 23. $y = \frac{3(2 - \sqrt{x})}{x}$ 25. $x^2y - x^2 + 4y = 0$

In Exercises 27-38, test for symmetry with respect to each axis and to the origin.

27. $y = x^2 - 2$ 29. $y^3 = x^3 - 4x$
 30. $y = x^3 + x$

In Exercises 39-56, sketch the graph of the equation. Identify any intercepts and test for symmetry.

45. $y = (x + 3)^2$ 51. $x = y^3$

In Exercises 61-68, find the points of intersection of the graphs of the equations.

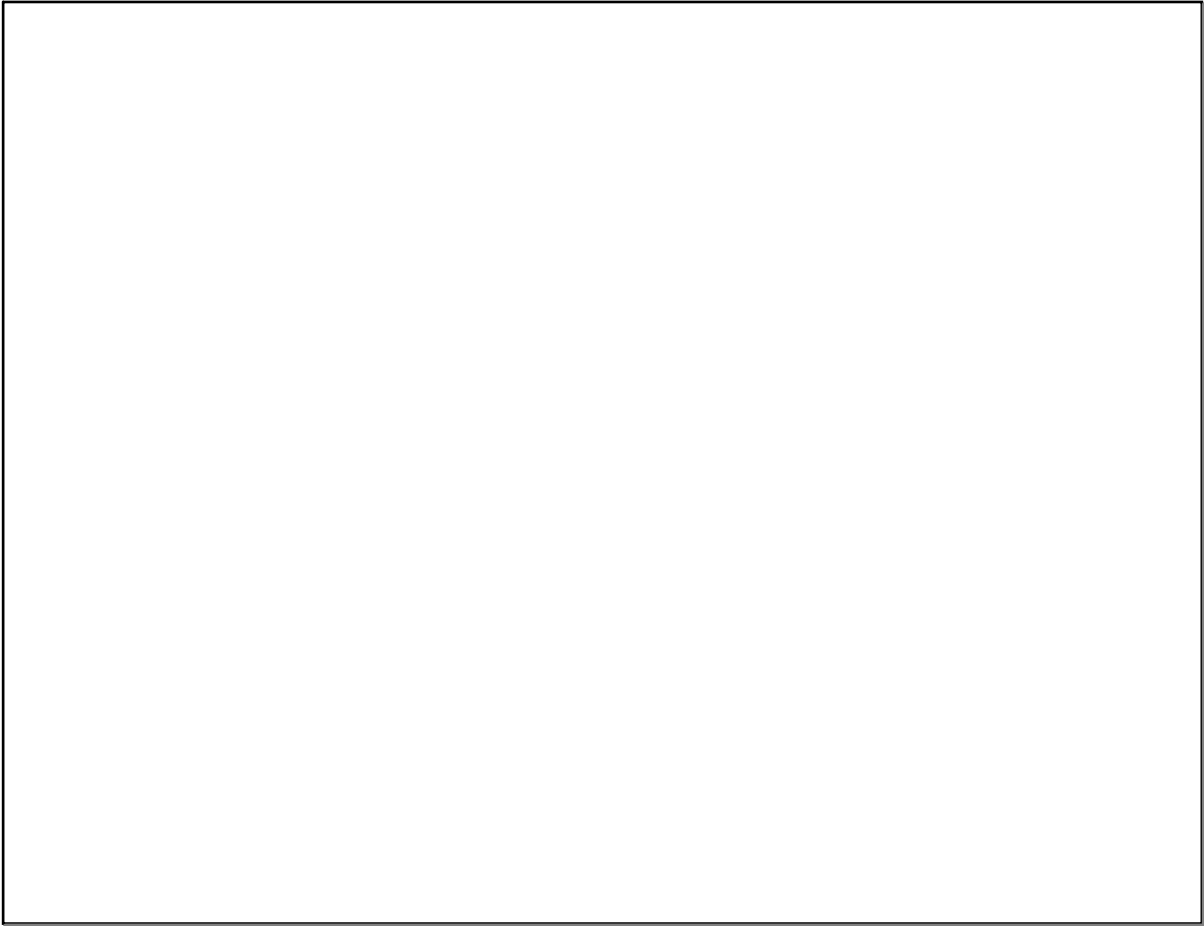
61. $x + y = 2$ 65. $x^2 + y^2 = 5$
 62. $2x - y = 1$ $x - y = 1$
 63. $x^2 + y = 6$

75. **Break-Even Point** Find the sales necessary to break even ($R = C$) if the cost C of producing x units is
 $C = 5.5\sqrt{x} + 10,000$ **Cost equation**
 and the revenue R for selling x units is
 $R = 3.29x$ **Revenue equation**

True or False? In Exercises 81-84, determine whether the statement is true or false. If it is false, explain why or give an example that shows it is false.

81. If $(1, -2)$ is a point on a graph that is symmetric with respect to the x -axis, then $(-1, -2)$ is also a point on the graph.
 82. If $(1, -2)$ is a point on a graph that is symmetric with respect to the y -axis, then $(-1, -2)$ is also a point on the graph.
 83. If $b^2 - 4ac > 0$ and $a \neq 0$, then the graph of $y = ax^2 + bx + c$ has two x -intercepts.
 84. If $b^2 - 4ac = 0$ and $a \neq 0$, then the graph of $y = ax^2 + bx + c$ has only one x -intercept.

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