ICNS 100 Homework 2

Problem 2.6

8. $y = |2x| - 2$

Intercepts: If $y = 0$, then $|2x| = 2$, $2|x| = 2$,

$|x| = 1$, so $x = \pm 1$; if $x = 0$, then $y = -2$.

Testing for symmetry gives:

x-axis: $-y = |2x| - 2$

$y = -|2x| + 2$

y-axis: $y = |2(-x)| - 2$

$y = |2x| - 2$

origin: $-y = |2(-x)| - 2$

$y = -|2x| + 2$

line $y = x$: (a, b) on graph, then $b = |2a| - 2$ and

$a = \pm \dfrac{b+2}{2} \neq |2b| - 2$ for all b, so

(b, a) is not on the graph.

Answer: $(\pm 1, 0)$, $(0, -2)$; symmetry about y-axis

16. $y = \dfrac{x^4}{x+y}$

Intercepts: If $y = 0$, then $\dfrac{x^4}{x} = 0$, which has no solution; if $x = 0$, then $y = \dfrac{0}{y}$, which has no solution.

Testing for symmetry gives:

x-axis: $-y = \dfrac{x^4}{x + (-y)}$

$y = \dfrac{x^4}{-x + y}$

y-axis: $y = \dfrac{(-x)^4}{(-x) + y}$

$y = \dfrac{x^4}{-x + y}$

origin: $-y = \dfrac{(-x)^4}{(-x) + (-y)}$

$y = \dfrac{x^4}{x + y}$

line $y = x$: (a, b) on graph, then $b = \dfrac{a^4}{a+b}$, and

$a + b = \dfrac{a^4}{b}$, but $a + b = \dfrac{b^4}{a}$ will not necessarily be true, so (b, a) is not on the graph.

Answer: no intercepts; symmetry about origin

20. $3y = 5x - x^3$

Intercepts: If $y = 0$, then $5x - x^3 = 0$,

$x\left(\sqrt{5} + x\right)\left(\sqrt{5} - x\right) = 0$, so $x = 0$ or $x = \pm\sqrt{5}$; if

$x = 0$, then $y = 0$.

Testing for symmetry gives:

x-axis: $3(-y) = 5x - x^3$

$3y = -5x + x^3$

y-axis: $3y = 5(-x) - (-x)^3$

$3y = -5x + x^3$

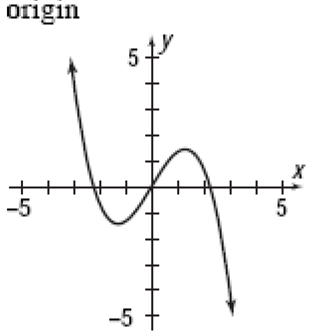
origin: $3(-y) = 5(-x) - (-x)^3$

$3y = 5x - x^3$.

line $y = x$: (a, b) on graph, then $3b = 5a - a^3$,

but $3a = 5b - b^3$ will not necessarily be true so (b, a) is not on the graph.

Answer: (0, 0), $\left(\pm\sqrt{5}, 0\right)$; symmetry about origin



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

Intercepts: If $y = 0$, then $x^2 = 4$, so $x = \pm 2$;
if $x = 0$, then $-y^2 = 4$, $y^2 = -4$, which has no real roots.

Testing for symmetry gives:

x-axis: $x^2 - (-y)^2 = 4$

$x^2 - y^2 = 4$

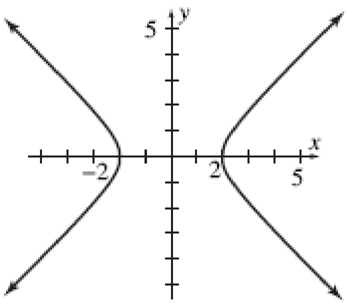
y-axis: $(-x)^2 - y^2 = 4$

$x^2 - y^2 = 4$

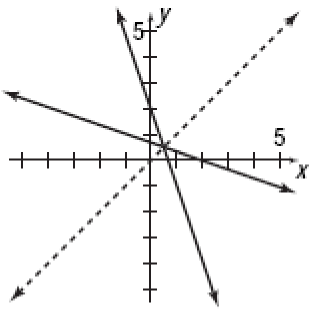
origin: Since there is symmetry about x-and y-axes, symmetry about origin exists.

line $y = x$: (a, b) on graph, then $a^2 - b^2 = 4$ and $a^2 = 4 + b^2 \neq b^2 - 4$ for all b, so (b, a) is not on the graph.

Answer: $(\pm 2, 0)$; symmetry about x-axis, y-axis, origin.

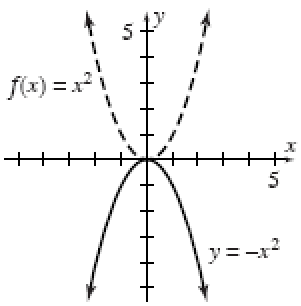


27.



<u>Problem 2.7</u>

2.



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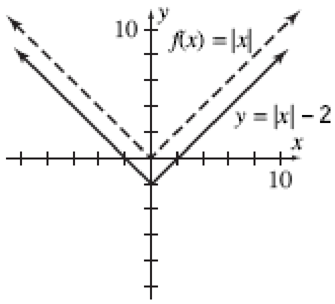
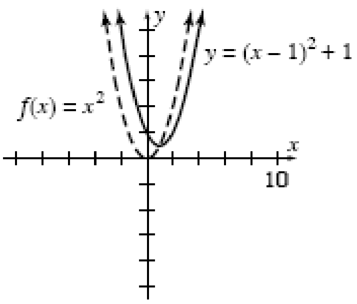


10.



14. Translate 3 units to the left and 4 units downward.