

Working with Absolute Value - worksheet

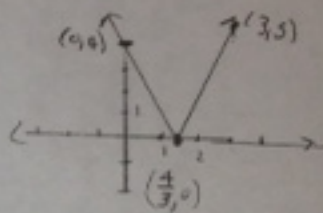
Rewrite the following functions as piecewise functions, using the definition to remove the absolute value bars. Then graph the function.

$$1) f(x) = |x| + 3x = \begin{cases} x+3x & \text{if } x \geq 0 \\ -x+3x & \text{if } x < 0 \end{cases} = \begin{cases} 4x & \text{if } x \geq 0 \\ 2x & \text{if } x < 0 \end{cases}$$

$$2) f(x) = \frac{2x}{|x|} = \begin{cases} \frac{2x}{x} & \text{if } x > 0 \\ \frac{2x}{-x} & \text{if } x < 0 \end{cases} = \begin{cases} 2 & \text{if } x > 0 \\ -2 & \text{if } x < 0 \end{cases}$$

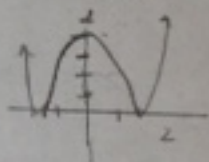
$$2) f(x) = |4-3x| = \begin{cases} 4-3x & \text{if } 4-3x \geq 0 \\ -(4-3x) & \text{if } 4-3x < 0 \end{cases} = \begin{cases} 4-3x & \text{if } x \leq \frac{4}{3} \\ -4+3x & \text{if } x > \frac{4}{3} \end{cases}$$

Solve for x



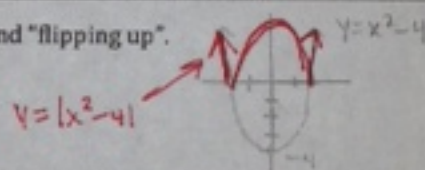
$$3) f(x) = |x^2 - 4| = \begin{cases} x^2 - 4 & \text{if } x^2 - 4 \geq 0 \\ -(x^2 - 4) & \text{if } x^2 - 4 < 0 \end{cases} = \begin{cases} x^2 - 4 & \text{if } x \geq 2 \text{ or } x \leq -2 \\ -x^2 + 4 & \text{if } -2 < x < 2 \end{cases}$$

Solve for x, quadratic - sign chart



4) Graph $f(x) = |x^2 - 4|$ by first graphing and "flipping up".

Graph $y = x^2 - 4$ where graph is below axis, reflect across x-axis. When graph is above, keep same.



5) Given the graph of $f(x)$, graph $|f(x)|$

