

Sketch the following piecewise function:

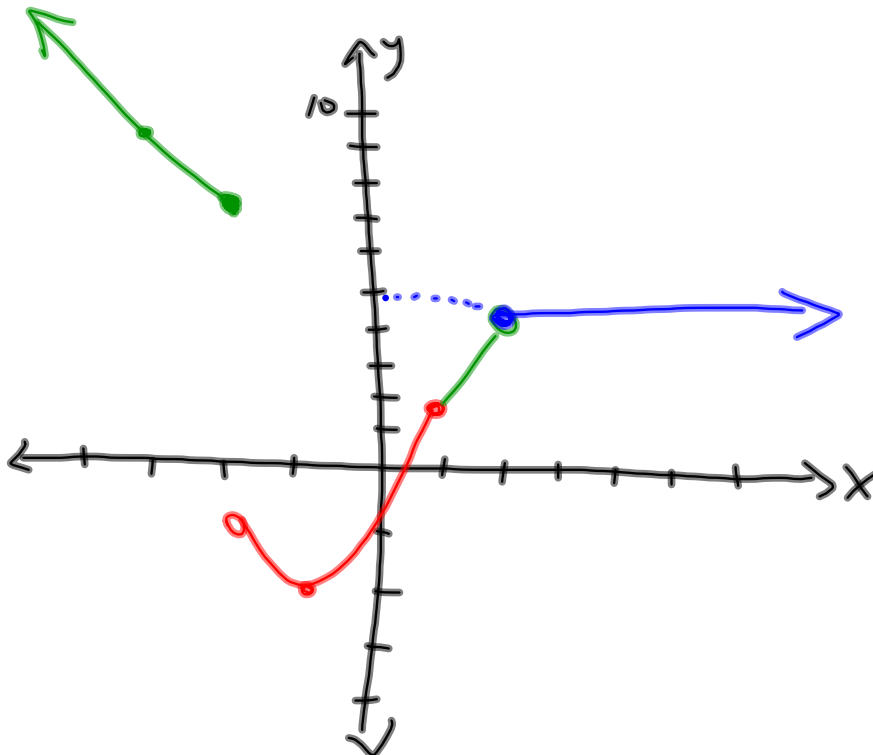
$$f(x) = \begin{cases} -2x + 3, & \text{if } x \leq -2 \\ (x+1)^2 - 2, & \text{if } -2 < x \leq 1 \\ 3x - 1, & \text{if } 1 < x < 2 \\ 5, & \text{if } x \geq 2 \end{cases}$$

Given the function:  $f(x) = -3|4 - 3x| + 2$

(a) Evaluate  $f(2)$

(b) Express  $f(x)$  as a piecewise function

①  $\begin{array}{c|c} x & y \\ \hline -2 & 7 \\ -3 & 9 \end{array}$      $\begin{array}{c|c} x & y \\ \hline -2 & -1 \\ -1 & -2^* \\ 1 & 2 \end{array}$      $\begin{array}{c|c} x & y \\ \hline 1 & 2 \\ 2 & 5 \end{array}$      $y = 5$



Given the function:  $f(x) = -3|4 - 3x| + 2$

(a) Evaluate  $f(2)$

$$\begin{aligned} f(2) &= -3|4 - 3(2)| + 2 \\ &= -3|-2| + 2 \\ &= -6 + 2 \\ &= \underline{\underline{-4}} \end{aligned}$$

(b) Express  $f(x)$  as a piecewise function

$$\begin{aligned} 2/ \quad f(x) &= -3 \underbrace{|4 - 3x|}_{\text{BB}} + 2 \\ \text{BBP} \quad & \quad \quad \quad \text{BB} \quad \quad \quad \text{BBN} \\ 4 - 3x &\geq 0 & | -8 | & \quad \quad \quad 4 - 3x < 0 \\ -3x &\geq -4 & -(-8) & \quad \quad \quad -3x < -4 \\ x &\leq \frac{4}{3} & & \quad \quad \quad \text{Then.. } x > \frac{4}{3} \\ \text{Then..} & & & & \\ f(x) &= -3(4 - 3x) + 2 & & & f(x) = 3(4 - 3x) + 2 \\ &= -12 + 9x + 2 & & & = 12 - 9x + 2 \\ &= 9x - 10 & & & = 14 - 9x \end{aligned}$$

$$f(x) = \begin{cases} 9x - 10 & \text{if } x \leq \frac{4}{3} \\ 14 - 9x & \text{if } x > \frac{4}{3} \end{cases}$$

# Catalog of Essential Functions

**1. Linear**

$y = 3x + 5$     $y = x^2 + 3$     $y = 3x^3 + x^8 + x^4$

degree 2   degree 3

$3xy + 10$     $xy + 16$     $xy - 12$

- Straight line
- Equation will be degree one
- Should be able to identify **slope**, **intercepts**, and **equation** from the graph

## 2. Quadratic

- Parabola (U-Shaped)
- Either  $x$  or  $y$  will be squared (Not both!)
- Should know the 4 basic quadratic functions
- Should be able to apply transformations to the basic quadratic functions

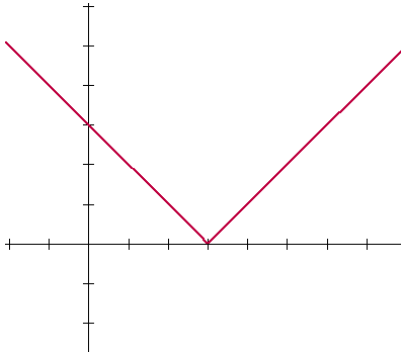
$y = x^2$     $y = -x^2$     $x = y^2$     $x = -y^2$

## 3. Cubic

- S-Shaped
- Will work with functions having  $x$  raised to the third power
- Should be able to apply transformations to the basic quadratic functions

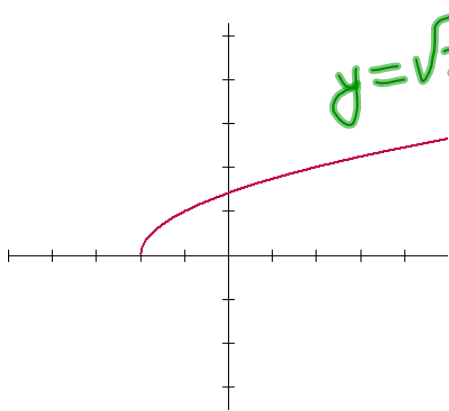
$y = x^3$     $y = x^3$

## 4. Absolute Value



- V-Shaped
- Equation will have a variable within the absolute value bars
- Should be able to apply transformations to the basic absolute value functions

## 5. Square Root



$$y = \sqrt{x+2}$$

- Half parabola
- Equation will have a variable under the square root sign
- Should be able to apply transformations to the basic square root function

## Attachments

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applications of sequences.doc