MATH HELP CENTRE

* MONDAY	Tues	Wed	Thurs.	Fri.
Kathryn	Whitney	Katelyn	Avery	Farhan
Jenna	Bernard	Johnny	Cody	Katelyn
Julianna	Farhan	Bern.	Julianna	John
	Laura	Farhan	Kathryn	Logan
				Bernard

Let's simplify things...

A function whose graph has holes or breaks is considered discontinuous at these particular points.

If you have to lift your pencil from the page to sketch the graph, it is discontinuous anywhere you lift your pencil

Examples:

Given the function $f(x) = \begin{cases} 3-x & , \quad \text{if } x < -1 \\ 4 & , \quad \text{if } -1 \leq x < 2 \\ 1 & , \quad \text{if } x = 2 \\ 8-x^2 & , \quad \text{if } x > 2 \end{cases}$

(a) Check $f(x)$ for any points of discontinuity. Provide a mathematical reason to validate any point(s) where the function is discontinuous.

(b) Sketch $f(x)$.

$\underline{x=-1}$

① $f(-1)=4$ ✓

② $\lim_{x\to -1^-} f(x) = 3-(-1) = 4$ $\qquad \lim_{x\to -1^+} f(x) = 4$

③ $f(-1) = \lim_{x\to -1} f(x)$

$\therefore f(x)$ is continuous at $x=-1$

$\underline{x=2}$

✓ ① $f(2) = 1$

✓ ② $\lim_{x\to 2^-} f(x) = 4$ $\qquad \lim_{x\to 2^+} f(x) = 8-(2)^2 = 4$

③ $\lim_{x\to 2} f(x) \neq f(2)$

$\therefore f(x)$ is discontinuous at $x=2$

$$f(x) = \begin{cases} 3 - x, & \text{if } x < -1 \\ 4, & \text{if } -1 \le x < 2 \\ 1, & \text{if } x = 2 \\ 8 - x^2, & \text{if } x > 2 \end{cases}$$

1

x	y
-1	4
-2	5

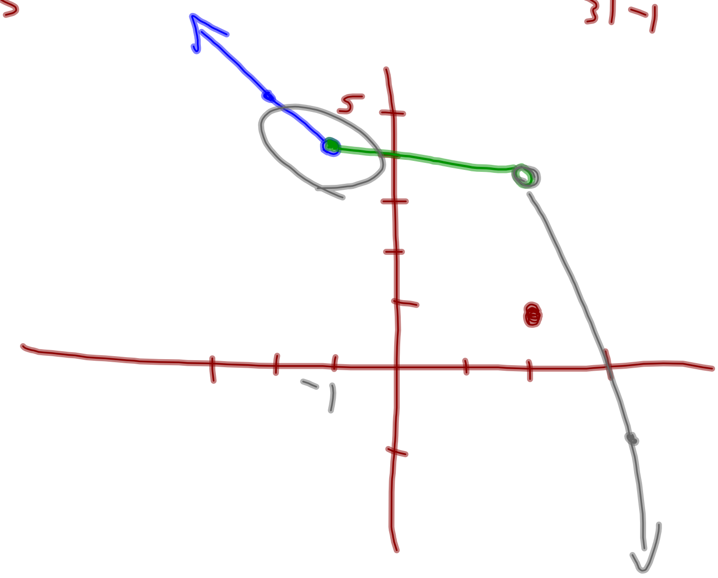
2 $y = 4$

3 $(2,1)$

4

x	y
2	4
3	-1

$V(0, +8)$
opens down



Given the function $f(x)=\begin{cases}2-x^2 & \text{if } x<1\\ 3 & \text{if } x=1\\ 2x-1 & \text{if } 1<x\le 3\\ (x-4)^2 & \text{if } x>3\end{cases}$

(a) Check $f(x)$ for any points of discontinuity. Provide a mathematical reason to validate any point(s) where the function is discontinuous.

(b) Sketch $f(x)$.

$\underline{\underline{x=1}}$

$f(1)=3$

$\lim_{x\to 1^-} f(x) = 2-(1)^2 = 1$

$\lim_{x\to 1^+} f(x) = 2(1)-1 = 1$

$f(1) \neq \lim_{x\to 1} f(x)$

$\therefore$ discontinuous at $x=1$

$\underline{\underline{x=3}}$

$f(3) = 2(3)-1 = 5$

$\lim_{x\to 3^-} f(x) = 5$

$\lim_{x\to 3^+} f(x) = (3-4)^2 = 1$

$\lim_{x\to 3} f(x)$ D.N.E.

$\therefore f(x)$ is discontinuous at $x=3$

$y = -x^2 + 2$

$$f(x) = \begin{cases} 2 - x^2 & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 2x - 1 & \text{if } 1 < x \le 3 \\ (x-4)^2 & \text{if } x > 3 \end{cases}$$

$y = a(x-h)^2 + k$

$V(h, k)$

opens Down
$V(0,2)$

①

x	y
1	1
0	2

② (1,3)

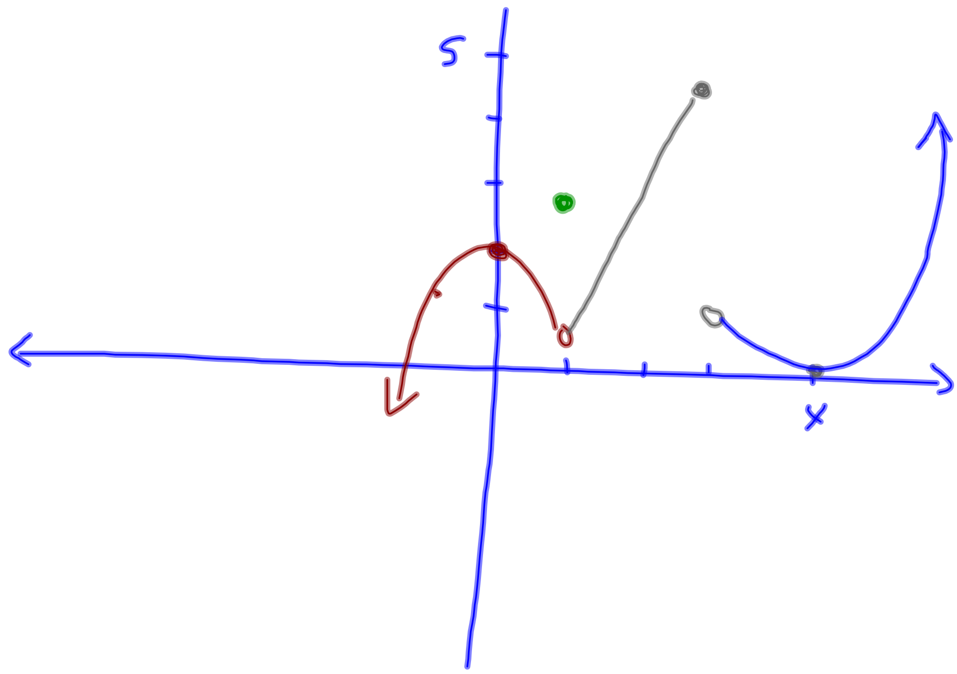
③

x	y
1	1
3	5

opens up
$V(4,0)$

④

x	y
3	1
4	0



BONUS

$$\lim_{x \to 1} \frac{\sqrt{x} - 1}{\sqrt[3]{x} - 1}$$

Homework

Page 27 - 29

1 - 10