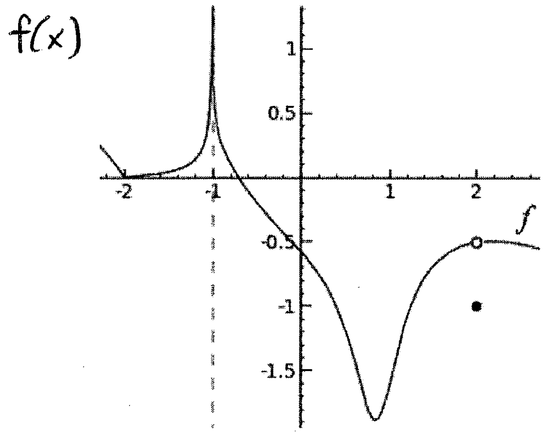
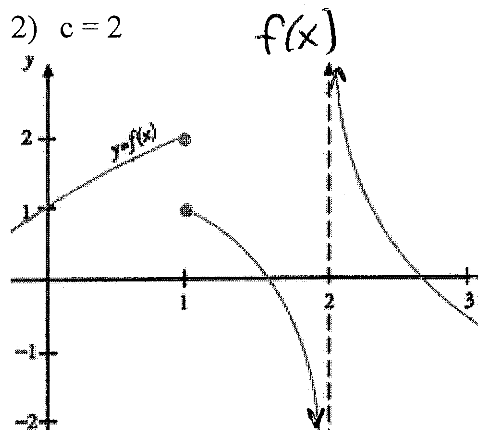
Non-AP Calculus 1.4-1.5 Quiz Review WS # 2

State why each of the graphs of the functions below are not continuous. Your answer must involve conditions for continuity. Then determine type of discontinuity.

1) c = 2



2) c = 2



3. For $f(x) = \begin{cases} 9 - x^2, & x < -2 \\ x^2 - 2x, & x \geq -2 \end{cases}$, use Continuity Conditions to show that f(x) is discontinuous at x = – 2 and state why it is discontinuous there. Then determine if the discontinuity is removable or non-removable and state why.

4. Verify that the Intermediate Value Theorem applies to the indicated interval and find the value of c guaranteed by the theorem:

$f(x) = 2x^2 - 5x + 7$ in the interval [0, 7] f(c) = 10

Find the following:

5) $\lim\limits_{x \to -5^-} \frac{25-x^2}{x-4} =$

6) $\lim\limits_{x \to 0^+} \frac{3x-x^2}{x^2-x} =$

7) $\lim\limits_{x \to -1^-} \frac{x^2+1}{x+1} =$

8) $\lim\limits_{x \to 5} \frac{3x^2-1}{25-x^2} =$

9) $\lim\limits_{x \to -2^+} \frac{4x^2+7x-2}{x+2}$

10) $\lim\limits_{x \to -5^+} \frac{2x^2-1}{x^2-25}$

11) $\lim\limits_{x \to 2^+} \frac{x^2-1}{x^2+2x+1} =$

12) $\lim\limits_{x \to -1^-} \frac{4x^2+2x-2}{x+1} =$

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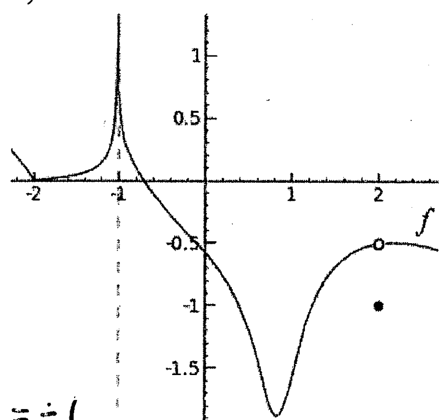
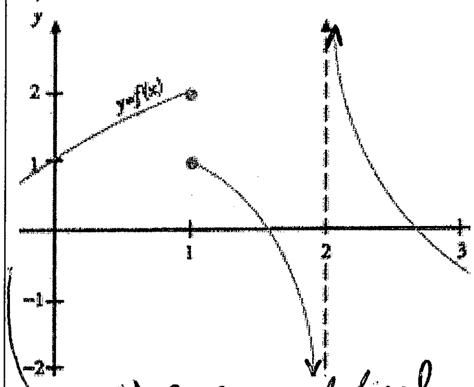
Key

State why each of the graphs of the functions below are not continuous. Your answer must involve conditions for continuity. Then determine type of discontinuity.

1) c = 2



2) c = 2



i) $f(2) = -1$

ii) $\lim_{x\to 2^-} f(x) = -0.5$ $\lim_{x\to 2^+} f(x) = -0.5$ $\lim_{x\to 2} f(x) = -0.5$

iii) $f(2) \neq \lim_{x\to 2} f(x)$ Removable Discontinuity at $x = 2$

i) $f(2) =$ undefined

ii) $\lim_{x\to 2^-} f(x) = -\infty$ $\lim_{x\to 2^+} f(x) = \infty$ $\lim_{x\to 2} f(x)$ DNE

Nonremovable Discontinuity at $x = 2$

3. For $f(x) = \begin{cases} 9 - x^2, & x < -2 \\ x^2 - 2x, & x \geq -2 \end{cases}$, use Continuity Conditions to show that f(x) is discontinuous at x = – 2 and state why it is discontinuous there. Then determine if the discontinuity is removable or non-removable and state why.

i) $f(-2) = (-2)^2 - 2(-2) = 8$

ii) $\lim_{x\to -2^-} 9 - x^2 = 5$ $\lim_{x\to -2^+} x^2 - 2x = 8$ $\lim_{x\to -2} f(x)$ DNE

Nonremovable Discontinuity at $x = -2$

4. Verify that the Intermediate Value Theorem applies to the indicated interval and find the value of c guaranteed by the theorem:

$f(x) = 2x^2 - 5x + 7$ in the interval [0, 7] f(c) = 10

f(x) continuous [0, 7]

$f(0) = 7$

$f(7) = 70$

By IVT, $f(c) = 0$ in [0, 7]

$2x^2 - 5x + 7 = 10$

$2x^2 - 5x - 3 = 0$

$(x-3)(2x+1) = 0$

$x = 3, -\frac{1}{2}$

$\boxed{c = 3}$

-6
-6 1
2 2
-5

Find the following:

5) $\lim\limits_{x\to-5^-} \frac{25-x^2}{x-4} =$ $\frac{25-25}{-5-4} = \frac{0}{-9}$

$\boxed{0}$

6) $\lim\limits_{x\to0^+} \frac{3x-x^2}{x^2-x} = \frac{0}{0}$

$\lim\limits_{x\to0^+} \frac{\cancel{x}(3-x)}{\cancel{x}(x-1)} = \frac{3-0}{0-1} = \boxed{-3}$

7) $\lim\limits_{x\to-1^-} \frac{x^2+1}{x+1} = \frac{(-1)^2+1}{-1+1} = \frac{2}{0}$ $\nearrow +\infty$ $\searrow -\infty$

-1.1

$\frac{(-1.1)^2+1}{(-1.1)+1} = \frac{+}{-} = \boxed{-\infty}$

8) $\lim\limits_{x\to5} \frac{3x^2-1}{25-x^2} =$ $\frac{74}{0}$ $\boxed{DNE}$

9) $\lim\limits_{x\to-2^+} \frac{4x^2+7x-2}{x+2}$ $\frac{0}{0}$

$+8, -8, -1, 4, 4, 7$

$\lim\limits_{x\to-2^+} \frac{(x\cancel{+2})(4x-1)}{(x\cancel{+2})} = \boxed{-9}$

10) $\lim\limits_{x\to-5^+} \frac{2x^2-1}{x^2-25}$ $\frac{49}{0}$ $\nearrow +\infty$ $\searrow -\infty$

-4.9 $\frac{2(-4.9)^2-1}{(-4.9)^2-25} = \frac{+}{-} = \boxed{-\infty}$

11) $\lim\limits_{x\to2^+} \frac{x^2-1}{x^2+2x+1} =$ $\frac{3}{9} = \boxed{\frac{1}{3}}$

12) $\lim\limits_{x\to-1^-} \frac{4x^2+2x-2}{x+1} =$ $\frac{0}{0}$

$2, -2, -1, 2, 2, 1$

$\lim\limits_{x\to-1^-} \frac{2(2x^2+x-1)}{x+1}$

$\lim\limits_{x\to-1^-} \frac{2(x\cancel{+1})(2x-1)}{(x\cancel{+1})} = 2(-3) = \boxed{-6}$