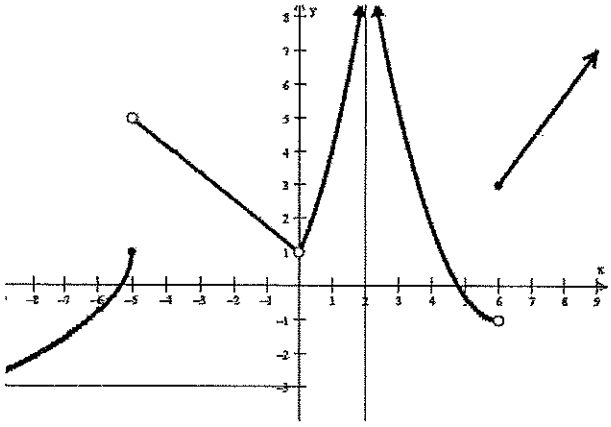
Name_____ AB Calculus
Limits and Continuity Day 1

Part 1: Evaluate the given limits and determine the domain and range of the function.



a. $\lim_{x\to -5} g(x) =$ DNE

b. $\lim_{x\to -5^+} g(x) =$ 5

c. $\lim_{x\to -5^-} g(x) =$ 1

d. $\lim_{x\to 0} g(x) =$ 1

e. $\lim_{x\to 0^+} g(x) =$ 1

f. $\lim_{x\to 0^-} g(x) =$ 1

g. $\lim_{x\to 2} g(x) =$ DNE

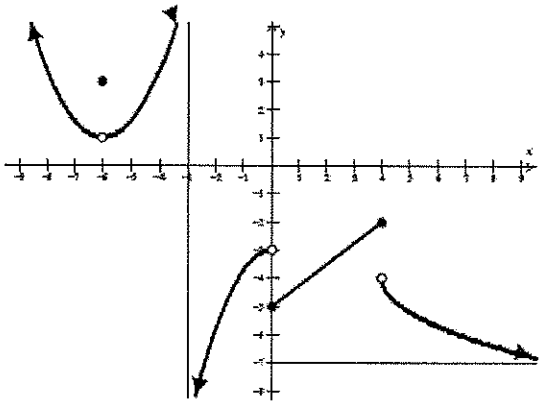
h. $\lim_{x\to 2^+} f(x) =$ DNE

i. $\lim_{x\to 2^-} g(x) =$ DNE

j. $\lim_{x\to 6} g(x) =$ DNE

k. $\lim_{x\to 6^+} f(x) =$ 3

l. $\lim_{x\to 6^-} g(x) =$ −1



a. $g(-6) =$ 3

b. $\lim_{x\to -3^+} g(x) =$ DNE

c. $\lim_{x\to -6^-} g(x) =$ 1

d. $\lim_{x\to 4} g(x) =$ DNE

e. $g(4) =$ −2

f. $\lim_{x\to 4^-} g(x) =$ −2

g. $\lim_{x\to \infty} g(x) =$ −7

h. $\lim_{x\to 0^+} f(x) =$ −5

i. $\lim_{x\to 0^-} g(x) =$ −3

j. $g(0) =$ −5

k. $\lim_{x\to 4^+} f(x) =$ −4

l. $g(-3) =$ DNE

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Part 2: Determine the limit

1) $\lim_{x\to -3}\frac{x^2-x-12}{x+3}=$

2) $\lim_{x\to 0}\frac{x^4-7x^2}{x^3+3x^2}=$

3) $\lim_{x\to 9}\frac{x-9}{3-\sqrt{x}}=$

4) $\lim_{x\to -1}\frac{x^2-1}{x^2-x-2}=$

5) $\lim_{x\to 2}\frac{\frac{1}{x}-\frac{1}{2}}{x-2}=$

6) $\lim_{x\to 0}\frac{x}{\sqrt{1+3x}-1}=$

7) $\lim_{x\to 4}\frac{2x-8}{x+2}=$

8) $\lim_{x\to 1}\frac{x^2+x-2}{x^2-3x+2}=$

Part 3: The velocity of a pebble that is dropped from a cliff that is 100 feet above the ocean is given by the function: $v(a)=\lim_{t\to a}\frac{h(a)-h(t)}{a-t}$ where a is the time in seconds after the pebble is dropped. The height of the pebble (in feet) above sea level is given by the function $h(t)=-16t^2+100$.

a. What will the velocity of pebble be 1 second after its dropped? (Hint Let a = 1)

b. When will the pebble land in the ocean? (Hint what will $h(t)$ equal when it lands?)

c. Use your answer to part b to find the velocity of the pebble when it hits the ground.

① $\lim_{x\to -3} \frac{x^2-x-12}{x+3} = \lim_{x\to -3} \frac{(x-4)(x+3)}{(x+3)} = -7$

② $\lim_{x\to 0} \frac{x^4-7x^2}{x^3+3x^2} = \lim_{x\to 0} \frac{x^2(x^2-7)}{x^2(x+3)} = -7/3$

③ $\lim_{x\to 9} \frac{x-9}{3-\sqrt{x}} = \lim_{x\to 9} \frac{-[9-x]}{3-\sqrt{x}} = \lim_{x\to 9} \frac{-(3-\sqrt{x})(3+\sqrt{x})}{3-\sqrt{x}} = -6$

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

⑤ $\lim_{x\to 2} \frac{\frac{1}{x}-\frac{1}{2}}{x-2} \quad \lim_{x\to 2} \frac{2-x}{2x}\cdot\frac{1}{x-2} \quad \lim_{x\to 2} -\frac{1}{2x} = -\frac{1}{4}$

⑥ $\lim_{x\to 0} \frac{x}{\sqrt{1+3x}-1}\cdot\frac{\sqrt{1+3x}+1}{\sqrt{1+3x}+1} \quad \lim_{x\to 0} \frac{x(\sqrt{1+3x})+1}{1+3x-1} = \lim_{x\to 0} \frac{(\sqrt{1+3x}+1}{3} = 2/3$

⑦ $\lim_{x\to 4} \frac{2(x-4)}{x+2} = 0$

⑧ $\lim_{v\to 1} \frac{(x+2)(x-1)}{(x-2)(x-1)} = \lim_{x\to 1} \frac{x+2}{x-2} = -\frac{3}{1}$

P3 a) $\lim_{t\to 1} \frac{h(1)-h(t)}{1-t} \quad h(1) = 84 \quad \lim_{t\to 1} \frac{84+16t^2-100}{1-t}$

$\lim_{t\to 1} \frac{-16+16t^2}{1-t} \quad \lim_{t\to 1} \frac{-16(1-t^2)}{1-t}$

$\lim_{t\to 1} \frac{-16(1+t)(1-t)}{(1-t)} = -\underline{\underline{32}}$ ft/sec

b) $-16t^2 + 100 = 0$

$t^2 = \frac{100}{16}$

$t = \frac{10}{4} = 2.5$ seconds

c) $v(2.5) = \lim_{t \to 2.5} \frac{h(2.5) - h(t)}{2.5 - t}$ $\quad h(2.5) = 0$

$\lim_{t \to 2.5} \frac{0 + 16t^2 - 100}{2.5 - t}$ $\quad \lim_{t \to 2.5} \frac{-16(6.25 - t^2)}{2.5 - t}$ $\quad \frac{-16(2.5 - t)(2.5 + t)}{2.5 - t}$

$\lim_{t \to 2.5} -16(2.5 + t) = -80 \text{ ft/sec}$