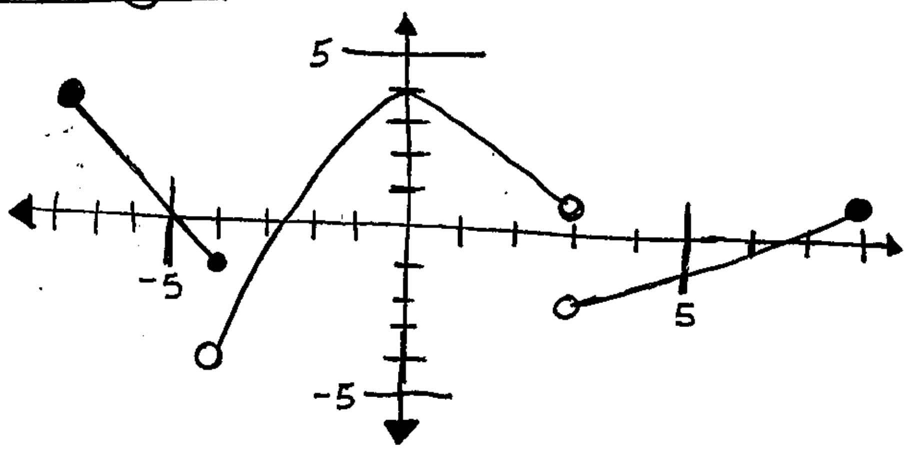
Non-Calculator

Chapter 2 Review

Name ____________
Class period ____
Lab period ____

1. **Use the graph of $y=f(x)$ to answer the following questions.**

$y = f(x)$



a) State the domain of $y=f(x)$

b) State the interval over which $y=f(x)$ is continuous

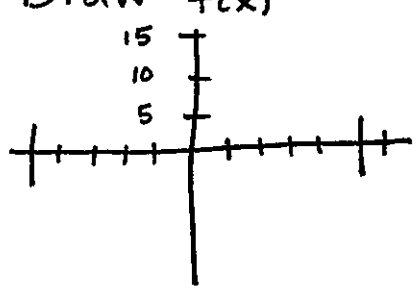
c) $f(-4)$

d) $f(0) =$

e) $f(3) =$

2. $$f(x) = \begin{cases} 3x+2 & x<0 \\ (x-1)^2 & 0 \le x < 5 \\ x-2 & x>5 \end{cases}$$

a) Draw $f(x)$



Determine

b) $f(0) =$

c) $f(5) =$

d) $f(4) =$

e) $f(10) =$

f) Is $f(x)$ continuous at $x=0$. Give reason why $f(x)$ is/is not continuous at $x=0$

③ Determine the limit of each:

a) $\lim_{x \to 3} \frac{x^2 - 9}{x - 3}$

b) $\lim_{x \to \infty} \frac{5x^2 + 2x - 3x^5}{x - 2}$

c) $\lim_{x \to \infty} \frac{4x^3 + 5x - 2}{3 - 2x - 5x^4}$

d) $\lim_{x \to -\infty} \frac{5x^3 - 4x + 1}{4 - x^2}$

e) $\lim_{x \to 0^-} \frac{x}{|x|}$

f) $\lim_{x \to 5} \frac{x^2 - 11x + 30}{x^2 - 25}$

g) $\lim_{x \to \infty} \frac{\cos x}{x}$

h) $\lim_{x \to 0} \frac{2x + \sin 2x}{2x}$

i) $\lim_{x \to \infty} \cos\left(\frac{1}{x}\right)$

j) $\lim_{x \to \infty} \frac{4x^3 - 3x + 2}{3x^3 + x^2 + x}$

④ Determine if the function is continuous at the given x value. Show why the function is/is not continuous at the x value.

a) $f(x) = \dfrac{x^2 - 11x + 30}{x^2 - 25}$ at $x = 5$

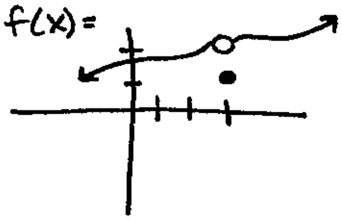
Circle one

Continuous/not Continuous

Explain:

____

b) $f(x) =$



at $x = 3$

Continuous/not Continuous

Explain:

____

⑤ Given that $f(x)$ and $g(x)$ are defined for all x values and

$$\lim_{x \to c} f(x) = 6 \qquad \lim_{x \to c} g(x) = 8$$

What is the $\lim_{x \to c} \dfrac{3f(x) + g(x)}{f(x)}$

6. Find the value of "a" so the function $g(x)$ is continuous:

$$g(x) = \begin{cases} 4x - 11 & x < 3 \\ ax^2 & x \geq 3 \end{cases}$$

7. The right end behavior model of the function $f(x) = 2x + e^{-x}$ is:

8. The left end behavior model of the function $f(x) = 2x + e^{-x}$ is:

9. Let $g(x) = x^2 - 3x + 4$

a) Find the average rate of change of g over the interval $[1,4]$

b) Find the rate of change of g at $x = 3$

c) Find the equation of the line tangent to g at $x = 3$

d) Find the equation of the line normal to g at $x = 3$

(10) Draw a function that meets the following conditions:

$f(2) = 3$

$\lim_{x \to 5^+} f(x) = \infty$

$\lim_{x \to \infty} f(x) = \infty$

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

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

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

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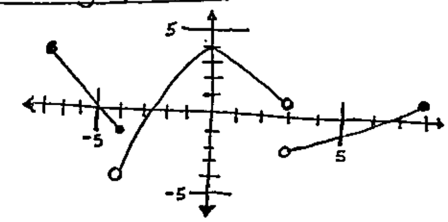
(1) Use the graph of $y=f(x)$ to answer the following questions.

$y=f(x)$



a) State the domain of $y=f(x)$

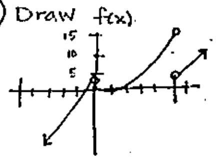
$[-8,3)(3,8]$

b) State the interval over which $y=f(x)$ is continuous $[-8,-4)(-4,3)(3,8]$

c) $f(-4) = -1$ d) $f(0) = 4$ e) $f(3) =$ d.n.e.

(2) $f(x) = \begin{cases} 3x+2 & x<0 \\ (x-1)^2 & 0 \le x < 5 \\ x-2 & x>5 \end{cases}$

a) Draw $f(x)$.



Determine

b) $f(0) = 1$

c) $f(5) =$ d.n.e.

d) $f(4) = 9$

e) $f(10) = 8$

f) Is $f(x)$ continuous at $x=0$. Give reason why $f(x)$ is/is not continuous at $x=0$

Not, $\lim_{x\to 0} f(x)$ d.n.e.

(3) Determine the limit of each:

a) $\lim_{x\to 3} \frac{x^2-9}{x-3}$ $\frac{(x+3)\cancel{(x-3)}}{\cancel{x-3}}$

$\lim_{x\to 3} x+3$

6

b) $\lim_{x\to\infty} \frac{5x^2+2x-3x^5}{x-2} = -\infty$

EB Model? $y=-3x^4$

c) $\lim_{x\to\infty} \frac{4x^3+5x-2}{3-2x-5x^4} = 0$

EB Model: $y=-\frac{4}{5x}$

d) $\lim_{x\to-\infty} \frac{5x^3-4x+1}{4-x^2} = \infty$

EB Model: $y=-5x$

e) $\lim_{x\to 0^-} \frac{x}{|x|} = -1$

f) $\lim_{x\to 5} \frac{x^2-11x+30}{x^2-25}$ $\frac{(x-6)(x-5)}{(x+5)(x-5)}$

$\lim_{x\to 5} \frac{x-6}{x+5} = \frac{-1}{10}$

g) $\lim_{x\to\infty} \frac{\cos x}{x} = 0$

h) $\lim_{x\to 0} \frac{2x+\sin 2x}{2x} = 2$

$\lim_{x\to 0} \frac{2x}{2x} + \frac{\sin 2x}{2x}$

$\lim_{x\to 0} 1 + \frac{2\sin x\cos x}{2x} = 1 + 1\cdot\cos$

$= 2$

i) $\lim_{x\to\infty} \cos\left(\frac{1}{x}\right) = 1$

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

EB Model: $y=\frac{4}{3}$

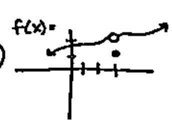
(4) Determine if the function is continuous at the given x value. Show why the function is/is not continuous at the x value.

a) $f(x) = \frac{x^2-11x+30}{x^2-25}$ at $x=5$

Circle one

Continuous / not Continuous

Explain: because when $x=5$ the denominator is zero

b)  at $x=3$

Continuous / not Continuous

Explain: because $\lim_{x\to 3} f(x) \neq f(3)$

(5) Given that $f(x)$ and $g(x)$ are defined for all x values and

$\lim_{x\to c} f(x) = 6$ $\lim_{x\to c} g(x) = 8$

What is the $\lim_{x\to c} \frac{3f(x)+g(x)}{f(x)}$ $\frac{3(6)+8}{6} = \frac{26}{6}$

$= \frac{13}{3}$

(6) Find the value of "a" so the function $g(x)$ is continuous:

$g(x) = \begin{cases} 4x-11 & x<3 \\ ax^2 & x \ge 3 \end{cases}$

$4x-11 = ax^2$

$4(3)-11 = a(3)^2$

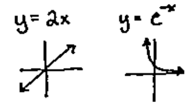
$1 = 9a$

$\boxed{\frac{1}{9} = a}$

(7) The right end behavior model of the function $f(x) = 2x + e^{-x}$ is:

$= \infty + 0$

$y=2x$ $y=e^{-x}$



$\boxed{f(x)=2x}$ is the right hand behavior model

(8) The left end behavior model of the function $f(x) = 2x+e^{-x}$ is:

e^{-x} is going up faster than $2x$ is going down so left hand behavior model

$\boxed{f(x)=e^{-x}}$

Be sure you can explain your reason for choosing your answer ☺

(9) Let $g(x) = x^2 - 3x + 4$

a) Find the average rate of change of g over the interval [1,4]

ave. rate of change $= \dfrac{g(4)-g(1)}{4-1}$

$= \dfrac{[(4)^2-3(4)+4]-[(1)^2-3(1)+4]}{4-1}$

$= \dfrac{[8]-[2]}{3}$

$= \boxed{2}$

b) Find the rate of change of g at x=3

$\lim_{h\to0} \dfrac{g(3+h)-g(3)}{(3+h)-(3)}$

$\lim_{h\to0} \dfrac{[(3+h)^2-3(3+h)+4]-[(3)^2-3(3)+4]}{h}$

$\lim_{h\to0} \dfrac{[9+6h+h^2-9-3h+4]-[4]}{h}$

$= \lim_{h\to0} \dfrac{3h+h^2}{h}$

$= \lim_{h\to0} 3+h$

$= \boxed{3}$

c) Find the equation of the line tangent to g at x=3

$g(3) = (3)^2-3(3)+4$
$= 4$
$(3,4)$

m @ x=3 is 3 from part b)

$\boxed{y-4=3(x-3)}$

d) Find the equation of the line normal to g at x=3

$\boxed{y-4=-\frac{1}{3}(x-3)}$

(10) Draw a function that meets the following conditions:

$f(2)=3$ $\quad \lim_{x\to5^+} f(x)=\infty$ $\quad \lim_{x\to\infty} f(x)=\infty$

$\lim_{x\to2} f(x)=-1$ $\quad \lim_{x\to5^-} f(x)=-\infty$ $\quad \lim_{x\to-\infty} f(x)=1$