Calculus BC

Chapter 2 Practice Test
Limits

Name Key

Show your work using Calculus were appropriate!

1. Determine the limit of the given function

a. $\lim_{x \to -3} (2x^2 - 3x + 2)$

$2(9) + 6 + 2 = \boxed{26}$

b. $\lim_{x \to -2} \left(\frac{x^2 + 3x + 2}{(x+2)^2} \right) = \lim_{x \to -2} \frac{\cancel{(x+2)}(x+1)}{(x+2)^{\cancel{2}}}$

D.N.E

can't remove the discontinuity

c. $\lim_{x \to 0} \left(\frac{3^x - 4^x}{3^x + 4^x} \right) = \frac{1-1}{1+1} = \boxed{0}$

d. $\lim_{x \to 0} \left(\frac{2x^4 - 6x^3 - 3x - 12}{-5x^4 + 4x^3 + x^2 - 2x} \right) = \boxed{-\frac{2}{5}}$

Change to ∞

2. Use the graph below to answer the following questions.

a. $\lim_{x\to 1^-} g(x)$

1

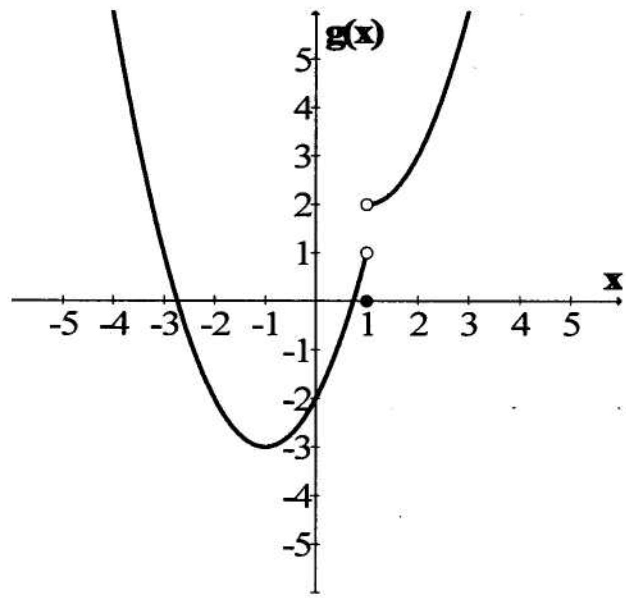
b. $\lim_{x\to 1^+} g(x)$

2

c. $\lim_{x\to 1} g(x)$

D.N.E.

d. g(1) = 0



3. Find all numbers for which the function is not continuous. At each point(s) of discontinuity determine if the discontinuity is jump, infinite, or removable.

a. $f(x)=\dfrac{5}{x^2-5x-14} = \dfrac{5}{(x-7)(x+2)} =$

NonRemovable, infinite discontinuity at $x=7$ and $x=-2$.

b. $f(x)=\dfrac{x^2+5x+6}{x^2+x-2} = \dfrac{(x+3)(x+2)}{(x+2)(x-1)}$

Nonremovable discontinuity at $x=1$
Removable discontinuity at $x=-2$.

change to

x=3

4. Given the function $f(x)=\begin{cases} x^2-2, & x<3 \\ x+5, & x\geq 3 \end{cases}$

Determine whether the function is continuous at ~~x=1~~ x=3. Show your work.

$\lim_{x\to 3^-} = 9-2=7$

$\lim_{x\to 3^+} = 3+5=8$

Not continuous b/c lim from the left not equal to lim from the right at x=3

The function is not

5. Given the function $f(x)=\begin{cases} 2x^2-3x+2, & x<1 \\ 3x+k, & x\geq 1 \end{cases}$

Find the value of k which makes the function continuous. Show your work.

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

$\lim_{x\to 1^+} f(x) = 3(1)+k$

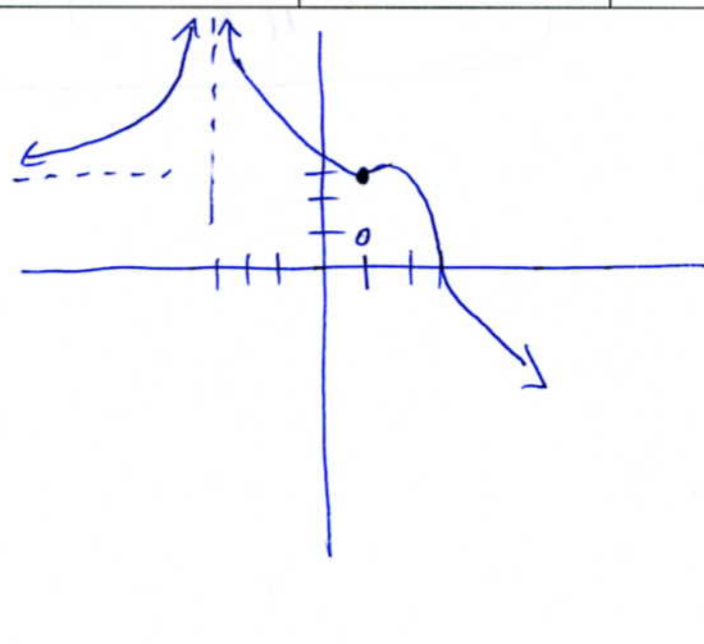
$3+k=1$

$k=-2$

K must = -2 to

6. Draw a sketch of a function that satisfies all of the following conditions:

$\lim_{x\to-\infty} f(x)=3$	$\lim_{x\to -3^-} f(x)=+\infty$	$\lim_{x\to 1^+} f(x)=3$	~~$\lim_{x\to 1^+} f(x)=1$~~
$\lim_{x\to-3^+} f(x)=+\infty$	$\lim_{x\to 1^-} f(x)=1$	$f(1)=3$	$f(3)=0$



7. Given the function $f(x) = 2x^2 + 3x - 5$ at the point (2, 9)

$f'(x) = 4x + 3$
$f'(2) = 8 + 3 = 11$

a) Find the slope of the curve at the given point. Show your work that leads to the answer.

$$\text{Slope} = \lim_{h \to 0} \frac{f(2+h) - f(2)}{h} = \lim \frac{2(2+h)^2 + 3(2+h) - 5 - (2(2)^2 + 3(2) - 5)}{h}$$

$$= \lim_{h \to 0} \frac{\cancel{8} + 8h + 2h^2 \cancel{+6} + 3h \cancel{-5} \cancel{-8} \cancel{-6} \cancel{+5}}{h}$$

$$= \lim_{h \to 0} (8 + 2h + 3) = \boxed{11}$$

b) Write an equation for the tangent line at the given point.

$$\boxed{y - 9 = 11(x - 2)}$$

c) Write an equation for the normal line at the given point.

$$\boxed{y - 9 = -\frac{1}{11}(x - 2)}$$