Ans. Key - Unit 1 - Review

Score: _______/ 40 Name:____________________

Sketch a graph of a function g that satisfies all of the following conditions.

1.

a. $g(-5) = -2$

b. $\lim_{x \to -5^+} g(x) = 4$

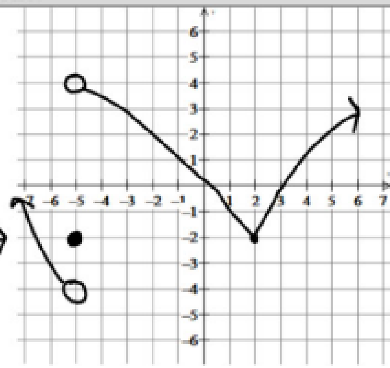
c. $\lim_{x \to -5^-} g(x) < g(-5)$

d. g is decreasing on $x < -5$

e. $\lim_{x \to 2} g(x) = g(-5)$

+2 pts each condition

possible graph



Evaluate the limit.

$\lim_{x \to 0} \frac{3x^6+x^3}{5x^5+3x^3}$

$\frac{\cancel{x^3}(3x^3+1)}{\cancel{x^3}(5x^2+3)}$

$\boxed{1/3}$

$\lim_{x \to 0} \frac{3-3\cos x}{x}$

$\boxed{0}$

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

$\boxed{3/2}$

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

$\frac{(x+1)}{(x+2)(x+2)}$

$\frac{-0.999}{(-0.0001)^2}$

$\boxed{-\infty}$

$\lim_{x \to \infty} \left(\frac{\cos x}{x} + 2\right)$

$0 + 2$

$\boxed{2}$

$\lim_{x \to 1} \frac{x-1}{\frac{1}{2-x}-1}$

$\frac{x-1}{\frac{1-(2-x)}{2-x}}$

$\frac{\cancel{x-1}}{1} \cdot \frac{2-x}{\cancel{-1+x}} = 2-1 = \boxed{1}$

$\lim_{x \to 8^+} \frac{x-8}{|x-8|}$

$\boxed{1}$

According to the table, what is value of $\lim_{x \to 13} f(x)$?

pts

$\boxed{-8}$

x	12.9	12.999	13.001	13.1
$f(x)$	−8.1	−8.001	−7.999	−7.9

Identify any horizontal asymptote(s) of the following functions

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

pts

$\frac{-6x^2 + \sim}{4x^2 + \sim}$

$\boxed{y = -3/2}$

$f(x) = \frac{\sqrt{25x^6-2x^2+5x}}{2x^3+3x^2}$

pts

$\boxed{y = \pm 5/2}$

For each function identify the type of each discontinuity and where it is located.

$f(x) = \frac{x+2}{x^2+10x+21}$

pts $(x+7)(x+3)$

$\boxed{\begin{array}{l} \text{V.A. at } x=-7 \\ \text{V.A. at } x=-3 \end{array}}$

Find the domain of each function.

$f(x) = \ln\left(\frac{6}{x-3}\right)$

$\frac{6}{x-3} > 0$

$x \neq 3$

$\boxed{x > 3}$

Let g and h be the functions defined by $g(x) = -\frac{1}{2}x^2 + x - \frac{3}{2}$ and $h(x) = \sin\left(\frac{\pi}{2}(x+2)\right)$. If f is a function that satisfies $g(x) \leq f(x) \leq h(x)$ for all x, what is $\lim_{x \to 1} f(x)$?

pts $-\frac{1}{2} + 1 - \frac{3}{2}$

-1

$\boxed{-1}$

$\sin\left(\frac{\pi}{2} \cdot 3\right)$

-1

State whether the function is continuous at the given x values. Justify your answers!

$$f(x) = \begin{cases} \tan\frac{x}{2}, & x < 0 \\ \sin(2x), & 0 \leq x \leq \pi \\ \cos\left(\frac{x}{4}\right), & x > \pi \end{cases}$$

pts

$\tan(0) = 0$

$\sin(0) = 0$

$\sin \pi = 0$

$\cos\frac{\pi}{4} = \frac{\sqrt{3}}{2}$

Continuous at $x = 0$?

Yes

$f(0) = 0$ and

$\lim_{x \to 0} f(x) = f(0)$

Continuous at $x = \pi$?

No

$\lim_{x \to \pi^-} f(x) \neq \lim_{x \to \pi^+} f(x)$

Let f be the function defined by $f(x) = \begin{cases} \frac{x^2+8x+7}{x+1}, & x \neq -1 \\ b, & x = -1 \end{cases}$. For what value of b is f continuous at $x = -1$?

2 pts

$$\frac{(x+7)\cancel{(x+1)}}{\cancel{x+1}}$$

$$-1+7=b$$

$$\boxed{6=b}$$

. $\lim_{x\to\infty} \frac{\ln|x|+\pi}{x} =$

pts

B

(A) $-\infty$ (B) 0 (C) e (D) ∞ (E) The limit does not exist.