

Limits, Continuity & Derivatives

Chapter 1, 2, 3 & 4 Review I

Find the limits by using any method. Then, circle which method you used.

#1) $\lim_{x \rightarrow 0} \frac{4}{2x - x^2}$

Graphing

Table

Substitution

#3) $\lim_{x \rightarrow 0} \frac{x^2 - 4x + 9x^3}{x}$

Graphing

Table

Substitution

#2) $\lim_{x \rightarrow 8} \frac{5x^2 - 7x + 4}{x^2 - 3x}$

Graphing

Table

Substitution

#4) $\lim_{x \rightarrow 10} \frac{x^2 - 5x - 50}{x^2 - 100}$

Graphing

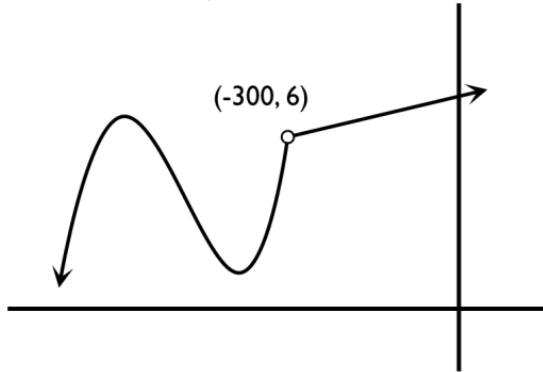
Table

Substitution

Limits, Continuity & Derivatives

Chapter 1, 2, 3 & 4 Review I

#5) Use the graph of the piecewise function to state each of the limits. Then decide if the function is continuous at $x = -300$. If not, state why.

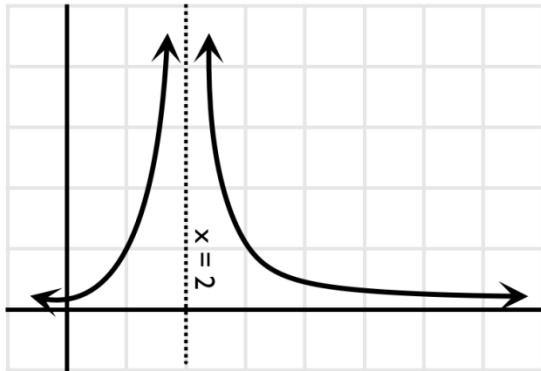


- a. $\lim_{x \rightarrow -300^-} f(x) =$
- b. $\lim_{x \rightarrow -300^+} f(x) =$
- c. $\lim_{x \rightarrow -300} f(x) =$
- d. Is the function continuous at $x = -300$? If not, why not?

#7) Find $f'(x)$ by using the definition of the derivative.

$$f(x) = \frac{x}{x^2+9}$$

#6) Use the graph to state the limit.



$$\lim_{x \rightarrow 1} f(x) =$$

Limits, Continuity & Derivatives

Chapter 1, 2, 3 & 4 Review I

#8) Find the equation for the tangent line to the curve $f(x) = -4x^2 - 62x + 8$ at $x = -3$. Write the answer in slope-intercept form.

#9) If $h(x) = (3x^3 - 7)^5(9x^2 + 8)^4$ find $\frac{dh}{dx}$.

Limits, Continuity & Derivatives
Chapter 1, 2, 3 & 4 Review I

#10) If $f(x) = \frac{(6x^2+8)^5}{(x^2+1)^3}$ find $\left. \frac{df}{dx} \right|_{x=1}$

#11) If $h(x) = 6x^2 - x + 7$ find $\frac{d^2h}{dx^2}$

Limits, Continuity & Derivatives
Chapter 1, 2, 3 & 4 Review I

#12) If $f(x) = \frac{1}{x}$ find $f'''(x)$

#14) If $g(x) = \frac{1}{\sqrt[8]{(5x^3-8)^7}}$ find $g'(x)$

#13) If $h(x) = (9x^2 - 3x + 1)^8$ find $h'(x)$

Limits, Continuity & Derivatives
Chapter 1, 2, 3 & 4 Review I

#15) If $k(x) = (3x - 11)^8(2x + 1)^5$ find $k'(x)$

#16) If $w(x) = \left(\frac{x^2-8}{x^3+1}\right)^3$ find $w'(x)$

Limits, Continuity & Derivatives

Chapter 1, 2, 3 & 4 Review I

#17) While in the hospital recovering from food poisoning reaction, George finds himself with nothing but time on his hands. That's right; he decides to steal all the clocks in the hospital.

George's revenue from selling x hospital clocks is $R(x) = \sqrt{x^3 + 3x}$ dollars (for $0 \leq x \leq 10$).

- a. Find the marginal average revenue function.

$$MAR(x) =$$

- b. Evaluate the marginal average revenue function at 5 and interpret this answer.

$$MAR(5) =$$

$$\text{Interpretation} =$$

#18) With his newfound fortune of \$32.09, George has a rare wise thought. He deposits the money in an account earning interest at r percent annually, after 3 years its value will be $V(r) = 32.09(1 + 0.01r)^3$ dollars.

Find $V'(8)$ and interpret this answer.

$$V'(8) =$$

$$\text{Interpretation} =$$

Limits, Continuity & Derivatives

Chapter 1, 2, 3 & 4 Review I

#19) All good plans seem to fail when George is involved. Instead of investing his \$32.09, George went to Burger King and blew his money on Whoppers. Sadly for Burger King, George did a little more than give them money; he also gave them fleas. The number of fleas at this Burger King x days from George infecting them is predicted to be $P(x) = \sqrt[4]{x^2 + 1}$ million fleas for $1 \leq x \leq 5$.

- a. Find $P'(3)$ and interpret this answer.

$$P'(3) =$$

Interpretation =

- b. Assume $P''(3) = -.031120$. Interpret this answer.

Interpretation =

#20) After a delicious lunch, George continues on his journey to California. Brainless and penniless, he hops on a super train. At t hours on the train George is $s(t) = 12t^2 - t^3$ miles due north of its starting point (for $0 \leq t \leq 12$).

- a. Find George's velocity at time $t = 3$ hours. Write your answer as a sentence.

- b. Find his velocity at time $t = 8$ hours. Write your answer as a sentence.

- c. Find his acceleration at time $t = 8$ hours. Write your answer as a sentence.

Limits, Continuity & Derivatives

Chapter 1, 2, 3 & 4 Review I

#21) Six hours after the train headed north, the crewmen found George. And what does a crew do with a stow away? They roll out the cannon. George's height can be found by the function

$$h(t) = -0.025(t - 15.5)^2 + 6.00625$$

where t is the number of seconds after George has been shot out of the cannon and $h(t)$ is the height in feet.

- a. How long will it take for George to hit the ground? Use a sentence answer.

- b. With what velocity will George hit the ground? Use a sentence answer.

#22) Dusting himself off, resilient George finds \$50 laying in the dirt. He also finds himself no more closer to California than when he started his journey. In fact, he now finds himself in Canada. He gets another brilliant idea: ride a rocket to California. Because Canadian law is so lax, anyone can buy a rocket at any time. No questions asked. Oh, and every rocket in Canada costs exactly \$50. George walks into a CVS and buys a rocket, straps himself to it and lights it. The rocket rises $s(t) = 8t^{5/2}$ feet in t seconds.

- a. Find George's velocity after 25 seconds. Use a sentence answer.

- b. Find George's acceleration after 25 seconds. Use a sentence answer.

Limits, Continuity & Derivatives
Chapter 1, 2, 3 & 4 Review I

$$\#23) \frac{d}{dx} [\sin(x^2 + 5)]$$

$$\#26) \frac{d}{dx} [\sin^2(x^2 + 5) + \cos^2(x^2 + 5)]$$

$$\#24) \frac{d}{dx} \left[\frac{\tan(x)}{\cot(x)} \right]$$

$$\#25) \frac{d}{dx} [(7x^2 - 4)\cos(x)]$$