ECO241 HW Questions for chapter 6

1. Given $y = 4x^2 + 9$, find the slope between 3 & 4 by using slope definition.

2. Given $y = 5x^2 - 4x$, find the slope between 2 & 3 by using slope definition.

3. Given the function $f = (v^2 + v - 56)/(v - 7)$, $(v \neq 7)$ find the left-side limit & the right-side limit of f as v approaches to 7. Can we conclude from these answers that f has a limit as v approaches 7?

4. Given $f = [(v+2)^3 - 8]/v$, $(v \neq 0)$, find:
(a) $\lim_{v \to 0} f$ (b) $\lim_{v \to 2} f$ (c) $\lim_{v \to a} f$

5. Given $f = 5 - \frac{1}{v}$, $(v \neq 0)$, find
(a) $\lim_{v \to +\infty} f$ (b) $\lim_{v \to -\infty} f$

6. Find the limits of the function $f = 8 - 9v + v^2$
(a) as $v \to 0$ (b) as $v \to 3$ (c) as $v \to -1$

7. Find the limits of $f = (v+2)(v-3)$
(a) as $v \to -1$, (b) as $v \to 0$, (c) as $v \to 4$.

8. Find the limits of $f = (3v+5)/(v+2)$
(a) as $v \to 0$, (b) as $v \to 5$ (c) as $v \to -1$.

9. Given $y = f(x) = \dfrac{x^2 + x - 20}{x - 4}$
(a) Is this function continuous at $x = 4$? Why?
(b)

10. $f(x) = \begin{cases} -2x+2 & \text{for } x < \frac{1}{2} \\ 2x & \text{for } x > \frac{1}{2} \end{cases}$

Find $\lim_{x \to \frac{1}{2}} f(x)$

11. $f(x) = \begin{cases} 3x+1 & \text{if } x \leq 1 \\ -x+1 & \text{if } x > 1 \end{cases}$

Find $\lim_{x \to 1} f(x)$

12. $y = x^2$

check if this function is continuous at $x = 0$.

13. $f(x) = \begin{cases} -2x+2 & \text{for } x < \frac{1}{2} \\ 2x & \text{for } x > \frac{1}{2} \end{cases}$

Is the a continuous function at $x = \frac{1}{2}$?

14. $f(x) = \begin{cases} 3x+1 & \text{if } x \leq 1 \\ -x+1 & \text{if } x > 1 \end{cases}$

Is the a continuous function at $x = 1$?

15. $y = \dfrac{x^2 - 2x + 1}{x^2 - 9}$

Is the a continuous function at $x = 3$ & $x = -3$?

16. Given $f(x) = 2\sqrt{x} + 1$, find the derivative at $x = 4$ by using the <u>definition</u> of the derivative.

17. Given the cost function $c(q) = q^3 - q^2 + 10q + 200$ check if $c(q)$ is continuous and differentiable at $x = 10$.

18. Given $f(x) = |3x-3| + 3$, check continuity & differentiability at $x = 1$.

19. Given $f(x) = \frac{1}{x}$, check continuity & differentiability at $x = 2$.

20. True or False.

(a) If the limit of $f(x)$ exists at $x = x_0$, the function should be continuous at $x = x_0$.

(b) If the function is continuous at $x = x_0$, then the function has the limit : $\lim_{x \to x_0} f(x) = f(x_0)$.

(c) Differentiable functions are always continuous.

(d) Continuous functions are always differentiable.

(e) When $x = x_0$ ~~does~~ is not in the domain, $\lim_{x \to x_0} f(x)$ cannot be defined.