[24]. Find the limit $\lim_{x\to\infty} \frac{2x^2}{(x+2)^3}$.

(a) 0 (b) 1 (c) 2 (d) 3 (e) The limit does not exist

[25]. Suppose the total cost, $C(q)$, of producing a quantity q of a product is given by the equation

$$C(q) = 5000 + 5q.$$

The average cost per unit quantity, $A(q)$, equals the total cost, $C(q)$, divided by the quantity produced, q. Find the limiting value of the average cost per unit as q tends to ∞. In other words find

$$\lim_{q\to\infty} A(q)$$

(a) 5 (b) 6 (c) 5000 (d) 5006 (e) The limit does not exist

Continuity and differentiability

[26]. Suppose $f(t) = \begin{cases} Bt & \text{if } t \leq 3 \\ 5 & \text{if } t > 3 \end{cases}$

Find a value of B such that the function $f(t)$ is continuous for all t.

(a) 3/5 (b) 4/5 (c) 5/3 (d) 5/4 (e) 5/2

[27]. Suppose that $f(x) = \begin{cases} A + x & \text{if } x < 2 \\ 1 + x^2 & \text{if } x \geq 2 \end{cases}$

Find a value of A such that the function $f(x)$ is continuous at the point $x = 2$.

(a) $A = 8$ (b) $A = 1$ (c) $A = 2$ (d) $A = 3$ (e) $A = 0$

[28]. Suppose $f(t) = \begin{cases} t & \text{if } t \leq 3 \\ A + \frac{t}{2} & \text{if } t > 3 \end{cases}$

Find a value of A such that the function $f(t)$ is continuous for all t.

(a) 1/2 (b) 1 (c) 3/2 (d) 2 (e) 5/2

[29]. Consider the function $f(x) = \begin{cases} 2x^2 + 3 & \text{if } x \leq 3 \\ 3x + B & \text{if } x > 3 \end{cases}$.

Find a value of B such that $f(x)$ is continuous at $x = 3$.

(a) 6 (b) 9 (c) 12 (d) 15 (e) There is no such value of B.

[30]. Find all values of a such that the function $f(x) = \begin{cases} x^2 + 2x & \text{if } x < a \\ -1 & \text{if } x \geq a \end{cases}$ is continuous everywhere.

(a) $a = -1$ only (b) $a = -2$ only (c) $a = -1$ and $a = 1$

(d) $a = -2$ and $a = 2$ (e) all real numbers

Answers

[24]. Find the limit $\lim_{x\to\infty} \frac{2x^2}{(x+2)^3}$.

[(a)] 0 (b) 1 (c) 2 (d) 3 (e) The limit does not exist

[25]. Suppose the total cost, $C(q)$, of producing a quantity q of a product is given by the equation

$$C(q) = 5000 + 5q.$$

The average cost per unit quantity, $A(q)$, equals the total cost, $C(q)$, divided by the quantity produced, q. Find the limiting value of the average cost per unit as q tends to ∞. In other words find

$$\lim_{q\to\infty} A(q)$$

[(a)] 5 (b) 6 (c) 5000 (d) 5006 (e) The limit does not exist

Continuity and differentiability

[26]. Suppose $f(t) = \begin{cases} Bt & \text{if } t \le 3 \\ 5 & \text{if } t > 3 \end{cases}$

Find a value of B such that the function $f(t)$ is continuous for all t.

(a) 3/5 (b) 4/5 **[(c)]** 5/3 (d) 5/4 (e) 5/2

[27]. Suppose that $f(x) = \begin{cases} A + x & \text{if } x < 2 \\ 1 + x^2 & \text{if } x \ge 2 \end{cases}$

Find a value of A such that the function $f(x)$ is continuous at the point $x = 2$.

(a) $A = 8$ (b) $A = 1$ (c) $A = 2$ **[(d)]** $A = 3$ (e) $A = 0$

[28]. Suppose $f(t) = \begin{cases} t & \text{if } t \le 3 \\ A + \frac{t}{2} & \text{if } t > 3 \end{cases}$

Find a value of A such that the function $f(t)$ is continuous for all t.

(a) 1/2 (b) 1 **[(c)]** 3/2 (d) 2 (e) 5/2

[29]. Consider the function $f(x) = \begin{cases} 2x^2 + 3 & \text{if } x \le 3 \\ 3x + B & \text{if } x > 3 \end{cases}$.

Find a value of B such that $f(x)$ is continuous at $x = 3$.

(a) 6 (b) 9 **[(c)]** 12 (d) 15 (e) There is no such value of B.

[30]. Find all values of a such that the function $f(x) = \begin{cases} x^2 + 2x & \text{if } x < a \\ -1 & \text{if } x \ge a \end{cases}$ is continuous everywhere.

[(a)] $a = -1$ only (b) $a = -2$ only (c) $a = -1$ and $a = 1$

(d) $a = -2$ and $a = 2$ (e) all real numbers