April 27 Math 1190 sec. 62 Spring 2017

Section 4.7: Optimization

Find the volume of the largest right circular cylinder that can be inscribed in a sphere of radius 10.

If you want to see this question answered, look at section 63's slides for Thurs. April 27.

The stuff we did starts on the next page.

Random Questions

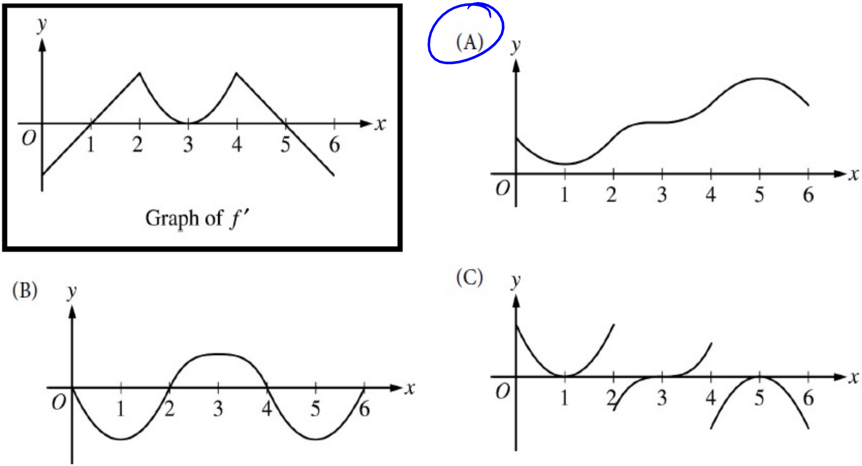


Figure: The graph of $f'(x)$ is shown in the upper left. Which of the three graphs could be the graph of $f(x)$?

1. $\lim_{x \to \pi} \dfrac{\cos x + \sin(2x) + 1}{x^2 - \pi^2}$ is

"$\frac{0}{0}$"

(A) $\dfrac{1}{2\pi}$

(B) $\dfrac{1}{\pi}$

(C) 1

(D) nonexistent

$\cos(\pi) + \sin(2\pi) + 1$

$-1 + 0 + 1 = 0$

$\pi^2 - \pi^2 = 0$

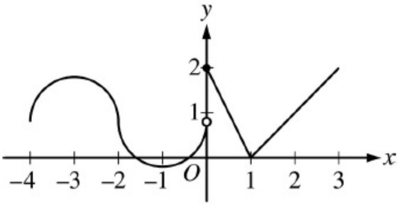
use l'H rule

$$\lim_{x \to \pi} \frac{-\sin x + \cos(2x) \cdot 2 + 0}{2x}$$

$$= \frac{-\sin \pi + 2\cos(2\pi)}{2\pi} = \frac{2}{2\pi}$$

$$= \frac{1}{\pi}$$

Figure: Evaluate the given limit.



Graph of f

The graph of the piecewise-defined function f is shown in the figure above. The graph has a vertical tangent line at $x = -2$ and horizontal tangent lines at $x = -3$ and $x = -1$. What are all values of x, $-4 < x < 3$, at which f is continuous but not differentiable?

(A) $x = 1$

(B) $x = -2$ and $x = 0$

(C) $x = -2$ and $x = 1$

(D) $x = 0$ and $x = 1$

Let f be the piecewise linear function

$$f(x) = \begin{cases} 2x - 2, & \text{for } x < 3 \\ 2x - 4, & \text{for } x \geq 3 \end{cases}$$

Compute

$3+h < 3$

(I) $\displaystyle \lim_{h\to 0^-} \frac{f(3+h) - f(3)}{h}$ and

(II) $\displaystyle \lim_{h\to 0^+} \frac{f(3+h) - f(3)}{h}$

$$\lim_{h\to 0^-} \frac{2(3+h)-2 - (2)}{h} = \lim_{h\to 0^-} \frac{6+2h-4}{h} = \lim_{h\to 0^-} \frac{2+2h}{h}$$

$$\lim_{h\to 0^+} \frac{2(3+h)-4 - (2)}{h} = 2$$

Let f be the piecewise linear function

$$f(x) = \begin{cases} 2x-2, & \text{for } x < 3 \\ 2x-4, & \text{for } x \geq 3 \end{cases}$$

Which of the following statements is/are true

(I) $\displaystyle\lim_{h\to 0^-} \frac{f(3+h)-f(3)}{h} = 2$, (II) $\displaystyle\lim_{h\to 0^+} \frac{f(3+h)-f(3)}{h} = 2$, (III) $f'(3) = 2$

(a) none

(b) II only

(c) I and II only

(d) I and II and III