Ch 1 Multiple Choice - Review

Answer Corrections on Ch 1 Review

2z) 4

7) 12

1h) $\lim\limits_{x\to\infty} \frac{x^2}{2^x} = 0$

$\lim\limits_{x\to\infty} \frac{2^x}{x^2} = \infty$

$\frac{x}{x^2+1}$

f.) $\lim\limits_{x\to 2} \frac{x-2}{\sqrt{x}-\sqrt{4-x}}$

$\lim\limits_{x\to 2} \frac{\cancel{(x-2)}(\sqrt{x}+\sqrt{4-x})}{\cancel{x-(4-x)}\ 2\cancel{(x-2)}}$

$\frac{\sqrt{2}+\sqrt{2}}{2}$

$\sqrt{2}$

$$\lim_{\Delta x \to 0} \frac{(x+\Delta x)^3 - x^3}{\Delta x}$$

$$(A+B)^3 = A^3 + 3A^2B + 3AB^2 + B^3$$

$$\lim_{\Delta x \to 0} \frac{\cancel{x^3} + 3x^2\Delta x + 3x\Delta x^2 + \Delta x^3 - \cancel{x^3}}{\Delta x}$$

$$\lim_{\Delta x \to 0} 3x^2 + \cancel{3x\Delta x} + \cancel{\Delta x^2}$$

$$3x^2$$

$$\lim_{x \to -\infty} \frac{\cos x}{x^4}$$

$$0$$

$$\lim_{x \to 0} \frac{11x}{\sin 4x}$$

$$\frac{11}{4} \lim_{x \to 0} \frac{x \cdot 4}{\sin 4x \cdot 4}$$

$$\frac{11}{4} \lim_{x \to 0} \frac{4x}{\sin 4x}$$

$$\frac{11}{4}$$

1.

Which of the following functions are continuous for all real numbers x ?

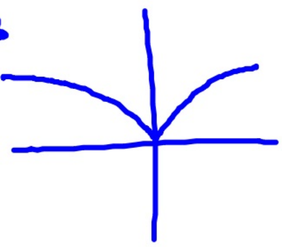
I. $y = x^{\frac{2}{3}}$

II. $y = e^{x}$

III. $y = \tan x$

(A) None (B) I only (C) II only (D) I and II (E) I and III

$x^{2/3}$



D

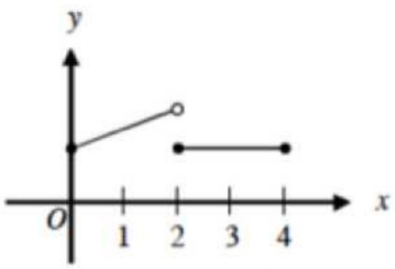
2.

$$\lim_{x \to 0} \frac{5x^4 + 8x^2}{3x^4 - 16x^2} \text{ is}$$

(A) $-\frac{1}{2}$ (B) 0 (C) 1 (D) $\frac{5}{3}+1$ (E) nonexistent

A

3.



Graph of f

. The figure above shows the graph of a function f with domain $0 \le x \le 4$. Which of the following statements are true?

I. $\lim_{x \to 2^-} f(x)$ exists.

II. $\lim_{x \to 2^+} f(x)$ exists.

III. $\lim_{x \to 2} f(x)$ exists.

(A) I only (B) II only (C) I and II only (D) I and III only (E) I, II, and III

C

4.

$\lim_{n\to\infty} \frac{4n^2}{n^2+10,000n}$ is

(A) 0 (B) $\frac{1}{2,500}$ (C) 1 (D) 4 (E) nonexistent

D

5.

If $\lim_{x \to a} f(x) = L$, where L is a real number, which of the following must be true?

(A) $f'(a)$ exists.

(B) $f(x)$ is continuous at $x = a$.

(C) $f(x)$ is defined at $x = a$.

(D) $f(a) = L$

(E) None of the above

6.

$\lim_{x \to 0} (x \csc x)$ is

(A) $-\infty$ (B) -1 (C) 0 (D) 1 (E) ∞

$$\lim_{x \to 0} \frac{x}{\sin x}$$

D

7.

$$\lim_{x\to 0}\frac{1-\cos^2(2x)}{x^2} =$$

(A) –2 (B) 0 (C) 1 (D) 2 (E) 4

$$\lim_{x\to 0}\frac{\sin^2(2x)}{x^2} = \lim_{x\to 0}\frac{\sin(2x)\,2}{x\;\,2}\,\frac{\sin(2x)\cdot 2}{x\;\cdot 2}$$

$$4\lim_{x\to 0}\frac{\sin 2x}{2x}\cdot\frac{\sin 2x}{2x}$$

E. 4

Pyth.

$\sin^2 x + \cos^2 x = 1$

$1 + \tan^2 x = \sec^2 x$

$1 + \cot^2 x = \csc^2 x$

Double Angles

$\sin 2x = 2\sin x \cos x$

$\cos 2x = \cos^2 x - \sin^2 x$

$= 1 - 2\sin^2 x$

$= 2\cos^2 x - 1$

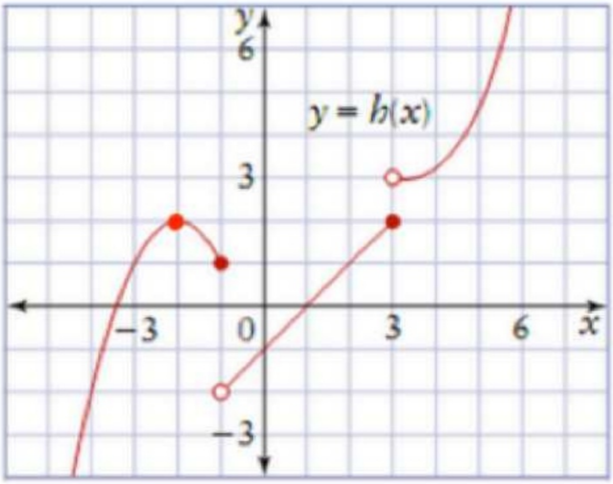
8.

If $\begin{cases} f(x) = \dfrac{\sqrt{2x+5}-\sqrt{x+7}}{x-2}, & \text{for } x \neq 2, \\ f(2) = k \end{cases}$ and if f is continuous at $x = 2$, then $k =$

(A) 0 (B) $\frac{1}{6}$ (C) $\frac{1}{3}$ (D) 1 (E) $\frac{7}{5}$

B

9a.

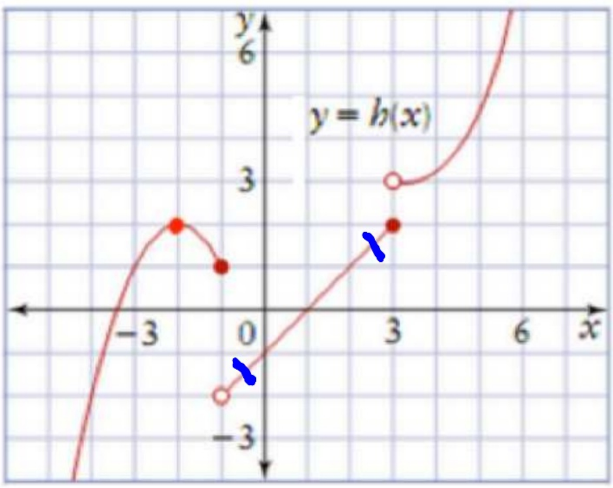


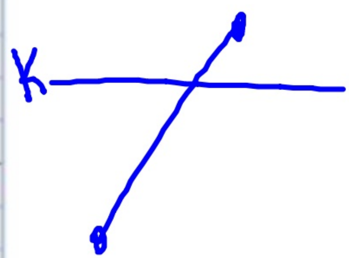
The largest value of $w \in \mathbf{R}$ such that $h(x)$ is continuous on $(-3, w]$ is

(A) 0 (B) –1 (C) –2 (D) –1.1 (E) No such value exists

B

9b.





On the interval $-0.5 \le x \le 2.5$, the IVT guarantees a value $-0.5 < j < 2.5$ such that $h(j) = 1$. What is j?

(A) 0 (B) 1 (C) 2 (D) 3 (E) the IVT does not apply

C

10.

The line $y=-7$ is a horizontal asymptote to the graph of which of the following functions?

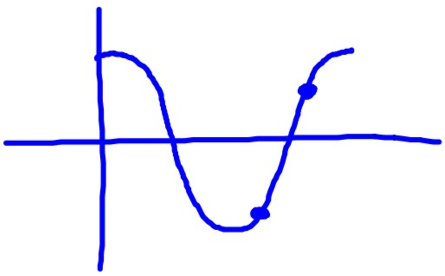
(A) $y=-\frac{\sin(7x)}{x}$ (B) $y=\frac{-7x^2+2x-1}{\sqrt{x^2+50}}$ (C) $y=\frac{1}{x+7}$ (D) $y=\frac{21x^3-2x^2-7}{7+9x-3x^3}$ (E) $y=\frac{-7x}{1-x}$

D

12.

If $g(x) = \cos x$, then on the interval $\left[\frac{7\pi}{6}, \frac{7\pi}{4}\right]$, by the IVT, $g(x)$ MUST equal what value for some $x \in \left(\frac{7\pi}{6}, \frac{7\pi}{4}\right)$?

(A) -1 (B) 1 (C) $\frac{4\pi}{3}$ (D) 0 (E) $\frac{\sqrt{3}}{2}$



15.

A function $f(x)$ is continuous for all x. The function satisfies

$$f(1)=10,\ f(2)=3,\ f(3)=-5, \text{ and } f(4)=-18$$

The IVT says that the equation

(A) $f(x)=8.675309$ has a solution for some $x\in(1,2)$.

(B) $f(x)=8.675309$ has a solution for some $x\in(2,3)$.

(C) $f(x)=8.675309$ has a solution for some $x\in(3,4)$.

(D) $f(x)=8.675309$ has a solution for some x with $x<-18$.

(E) It cannot be determined from the information whether $f(x)=8.675309$ has a solution.

A