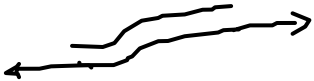
2. Which of the following functions of x is guaranteed by the Extreme Value Theorem to have an absolute maximum on the interval $[0, 4]$?



(A) $y = \tan x$ X

(B) $y = \tan^{-1} x$

(C) $y = \frac{x^2-16}{x^2+x-20}$ X $\quad \frac{(x+4)\cancel{(x-4)}}{\cancel{(x-4)}(x+5)}$ $\quad x+4=0$, $x=-4$ $\quad x+5=0$, $x=-5$

(D) $y = \frac{1}{e^x-1}$ X

Let g be the function given by $g(x) = \sqrt{1 - \sin^2 x}$. Which of the following statements could be false on the interval $0 \le x \le \pi$?

(A) By the Extreme Value Theorem, there is a value c such that $g(c) \le g(x)$ for $0 \le x \le \pi$. ✓

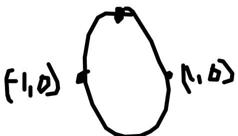
(B) By the Extreme Value Theorem, there is a value c such that $g(c) \ge g(x)$ for $0 \le x \le \pi$. ✓

(C) By the Intermediate Value Theorem, there is a value c such that $g(c) = \frac{g(0)+g(\pi)}{2}$. ✓

(D) By the Mean Value Theorem, there is a value c such that $g'(c) = \frac{g(\pi)-g(0)}{\pi-0}$. False

(0,1) $g(x) = \sqrt{1-\sin^2 x} = (1-\sin^2 x)^{\frac{1}{2}}$

$-\sin^2 x$



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

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

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

$g'(x)\ \frac{1}{2x^{\frac{1}{2}}}$

$1-\sin^2 x$

$\cos^2 x$

$(\cos x)(\cos x)$

$-\sin^2 x$

$\frac{1}{2(1-\sin^2 x)} \cdot$

$g'(x) = \frac{-\sin^2 x}{\sqrt{1-\sin^2 x}}$

not continuous at $\frac{\pi}{2}$

4.

x	0	1	2	3
$f(x)$	15	14	12	9

Let f be a function with selected values given in the table above. Which of the following statements must be true?

1. By the Intermediate Value Theorem, there is a value c in the interval $(0, 3)$ such that $f(c) = 10$.
2. By the Mean Value Theorem, there is a value c in the interval $(0, 3)$ such that $f'(c) = -2$.
3. By the Extreme Value Theorem, there is a value c in the interval $[0, 3]$ such that $f(c) \leq f(x)$ for all x in the interval $[0, 3]$.

(A) None

no assumption is made that the function is continuous

(B) I only

(C) II only

(D) I, II, and III