Function	1st Derivative/Critical #'s	Intervals of increasing/decreasing	2nd Derivative/ Possible POI	Concavity
$x^3 - 3x + 1$				
$y = x^2 - x - 1$				
$y = 2x^4 - 4x^2 + 1$				
$y = xe^x$				
$y = -2x^3 + 6x^2 - 3$				
$y = \frac{x}{x-1}$				
$y = \sin x + \cos x$				

The graph of $y = 5x^4 - x^5$ has a point of inflection at

(A) $(0,0)$ only (B) $(3,162)$ only (C) $(4,256)$ only

(D) $(0,0)$ and $(3,162)$ (E) $(0,0)$ and $(4,256)$

The MVT guarantees the existence of a special point on the graph of $y = \sqrt{x}$ between the (0, 0) and (4, 2). What are the coordinates of this point?

a) $(2, 1)$ b) $(1, 1)$ c) $(2, \sqrt{2})$ d) $\left(\frac{1}{2}, \frac{1}{\sqrt{2}}\right)$ e) None of these

The *derivative* of $f(x) = \frac{x^4}{3} - \frac{x^5}{5}$ attains its maximum value at $x =$

(A) -1 (B) 0 (C) 1 (D) $\frac{4}{3}$ (E) $\frac{5}{3}$

An equation of the line tangent to $y = x^3 + 3x^2 + 2$ at its point of inflection is

(A) $y = -6x - 6$ (B) $y = -3x + 1$ (C) $y = 2x + 10$

(D) $y = 3x - 1$ (E) $y = 4x + 1$

The graph of $y = \frac{-5}{x-2}$ is concave downward for all values of x such that

(A) $x < 0$ (B) $x < 2$ (C) $x < 5$ (D) $x > 0$ (E) $x > 2$

The absolute maximum value of $f(x) = x^3 - 3x^2 + 12$ on the closed interval $[-2, 4]$ occurs at $x =$

(A) 4 (B) 2 (C) 1 (D) 0 (E) -2

How many critical points does the function $f(x) = (x+2)^5 (x-3)^4$ have?

(A) One (B) Two (C) Three (D) Five (E) Nine

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Consider the function f given by $f(x) = x^{\frac{4}{3}} + 4x^{\frac{1}{3}}$ on the interval $-8 \le x \le 8$.

(a) Find the coordinates of all points at which the tangent to the curve is a horizontal line.

(b) Find the coordinates of all points at which the tangent to the curve is a vertical line.

(c) Find the coordinates of all points at which the absolute maximum and absolute minimum occur.

(d) For what values of x is this function concave down?

(e) On the axes provided, sketch the graph of the function on this interval.