I.3 Derivative Practice

Warm-Up

Find the slope of the line tangent to the curve $y = \ln(e^{x^2} + 2x)$ at its y-intercept.

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

16. If $y = 5x\sqrt{x^2 + 1}$, then $\frac{dy}{dx}$ at $x = 3$ is

(A) $\frac{5}{2\sqrt{10}}$ (B) $\frac{15}{\sqrt{10}}$ (C) $\frac{15}{2\sqrt{10}} + 5\sqrt{10}$ (D) $\frac{45}{\sqrt{10}} + 5\sqrt{10}$ (E) $\frac{45}{\sqrt{10}} + 15\sqrt{10}$

3. If $3x^2 + \tan(y) = 1$, what is dy/dx?

Key takeaways:
Implicit Differentiation

Derivative Rules:

AB 2018 #5

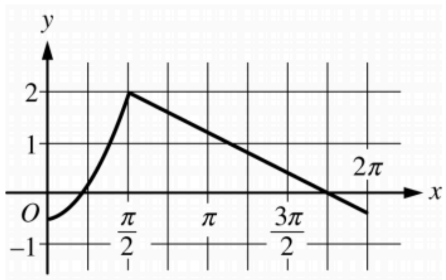
5. Let f be the function defined by $f(x) = e^x \cos x$.

(a) Find the average rate of change of f on the interval $0 \le x \le \pi$.

(b) What is the slope of the line tangent to the graph of f at $x = \frac{3\pi}{2}$?

(c) Find the absolute minimum value of f on the interval $0 \le x \le 2\pi$. Justify your answer.

(d) Let g be a differentiable function such that $g\left(\frac{\pi}{2}\right) = 0$. The graph of g', the derivative of g, is shown below. Find the value of $\lim_{x \to \pi/2} \frac{f(x)}{g(x)}$ or state that it does not exist. Justify your answer.



Graph of g'

The derivative f'(x) shows us the _______________ of f(x) at every x-value.

Where the slope of f(x) is 0 (a ___________________), the graph of f'(x) touches the

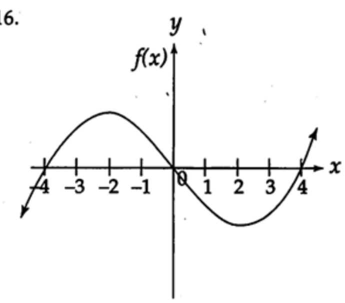
____________________.

A __________________ happens when f''(x) ____________________. That is where f'(x)

____________.

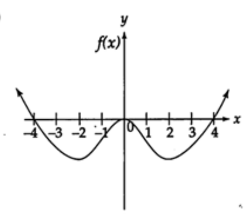
First Derivative (f'(x)	Second Derivative (f''(x))

16.

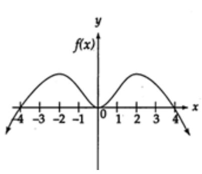


The graph of f(x) is shown in the figure at left. Which of the following could be the graph of f'(x)?

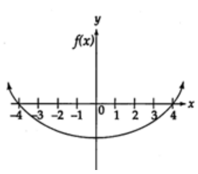
(C)



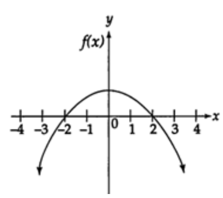
(A)



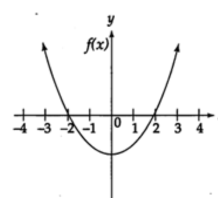
(D)



(B)



(E)

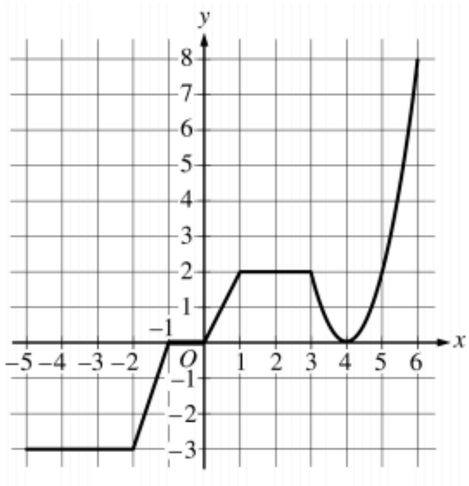


26. **The maximum velocity attained on the interval $0 \le t \le 5$ by the particle whose displacement is given by $s(t) = 2t^3 - 12t^2 + 16t + 2$ is**

(A) 286 **(B) 46** **(C) 16** **(D) 0** **(E) −8**

Finding an Absolute Extrema

BC 2018 #3



Graph of g

3. The graph of the continuous function g, the derivative of the function f, is shown above. The function g is piecewise linear for $-5 \le x < 3$, and $g(x) = 2(x-4)^2$ for $3 \le x \le 6$.

(a) If $f(1) = 3$, what is the value of $f(-5)$?

(b) Evaluate $\int_1^6 g(x)\,dx$.

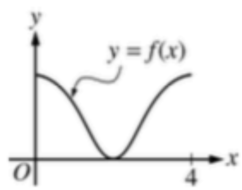
(c) For $-5 < x < 6$, on what open intervals, if any, is the graph of f both increasing and concave up? Give a reason for your answer.

(d) Find the x-coordinate of each point of inflection of the graph of f. Give a reason for your answer.

No Calc

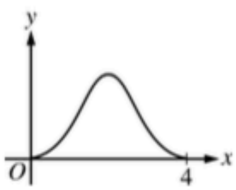
16. The function f is defined by $f(x) = 2x^3 - 4x^2 + 1$. The application of the Mean Value Theorem to f on the interval $1 \le x \le 3$ guarantees the existence of a value c, where $1 < c < 3$, such that $f'(c) =$

(A) 0 (B) 9 (C) 10 (D) 14 (E) 16

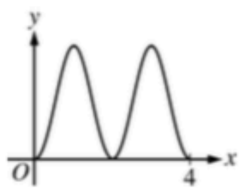


14. The graph of $y = f(x)$ on the closed interval $[0, 4]$ is shown above. Which of the following could be the graph of $y = f'(x)$?

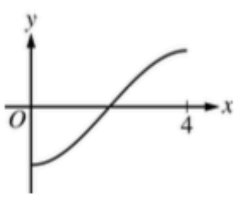
(A)



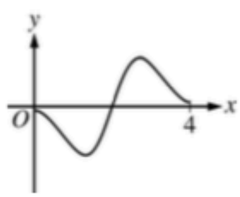
(B)



(C)



(D)



(E)