1. The graph of \( f' \), the derivative \( f \), is shown above for \(-2 \leq x \leq 5\). On what intervals is \( f \) increasing?
   
   (A) \([-2. 1]\) only
   
   (B) \([-2, 3]\)
   
   (C) \([3, 5]\) only
   
   (D) \([0, 1.5]\) and \([3, 5]\)
   
   (E) \([-2, -1], [1.2], \) and \([4, 5]\)

   \[ f(x) = \begin{cases} 
   \frac{x^2 - 4}{x - 2} & \text{if } x \neq 2 \\
   1 & \text{if } x = 2 
   \end{cases} \]

2. Let \( f \) be the function defined above. Which of the following statements about \( f \) are true?

   I. \( f \) has a limit at \( x = 2 \)

   II. \( f \) is continuous at \( x = 2 \).

   III. \( f \) is differentiable at \( x = 2 \).

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

3. If \( f(x) = \cos(3x) \), then \( f'(\frac{\pi}{9}) = \)

   (A) \( \frac{3\sqrt{3}}{2} \)  
   
   (B) \( \frac{\sqrt{3}}{2} \)  
   
   (C) \( -\frac{\sqrt{3}}{2} \)  
   
   (D) \( -\frac{3}{2} \)  
   
   (E) \( -\frac{3\sqrt{3}}{2} \)

4. In the \( xy \)-plane, the line \( x + y = k \), where \( k \) is a constant, is tangent to the graph of \( y = x^2 + 3x + 1 \). What is the value of \( k \)?

   (A) \(-3\)  
   
   (B) \(-2\)  
   
   (C) \(-1\)  
   
   (D) \(0\)  
   
   (E) \(1\)
The table gives selected values of the velocity $v(t)$ of a particle moving along the $x$-axis. At time $t = 0$, the particle is at the origin. Which of the following could be the graph of the position $s(t)$ of the particle for $0 \leq t \leq 4$?

If $\sin(xy) = x$, then \( \frac{dy}{dx} = \)

(A) \( \frac{1}{\cos(xy)} \)

(B) \( \frac{1}{x \cos(xy)} \)

(C) \( \frac{1 - \cos(xy)}{\cos(xy)} \)

(D) \( \frac{1 - y \cos(xy)}{x \cos(xy)} \)

(E) \( \frac{y(1 - \cos(xy))}{x} \)

If $f(x) = (x-1)(x^2 + 2)^3$, then $f'(x) =$

(A) $6x(x^2 + 2)^2$

(B) $6x(x-1)(x^2 + 2)^2$

(C) $(x^2 + 2)^2(x^2 + 3x - 1)$

(D) $(x^2 + 2)^2(7x^2 - 6x + 2)$

(E) $-3(x-1)(x^2 + 2)^2$

For values of $h$ very close to 0, which of the following best approximates $f(x) = \frac{\tan(x+h) - \tan x}{h}$?

(A) $\sin x$

(B) $\frac{\sin x}{x}$

(C) $\frac{\tan x}{x}$

(D) $\sec x$

(E) $\sec^2 x$
Let $f$ be the function defined above, where $c$ and $d$ are constants. If $f$ is differentiable at $x = 2$, what is the value of $c + d$?

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

10. The graph of a function $f$ is shown above. Which of the following could be the graph of $f'$, the derivative of $f$?

(A)  
(B)  
(C)  
(D)  
(E)  

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9. $f(x) = \begin{cases} cx + d & \text{for } x \leq 2 \\ x^2 - cx & \text{for } x > 2 \end{cases}$