

1. If $f(x) = 2x^2 - 3x + 1$, then find f'' at $x = 1$.
A) 8 B) 6 C) 4 D) 3 E) 1
2. If $f(x) = \sqrt{2x-1}$, then find f' at $x = 5$.
A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{2}{3}$ D) $\frac{1}{\sqrt{3}}$ E) 5
3. If $f(x) = \left(\frac{x}{x+2}\right)^3$, then find f' at $x = -1$.
A) -6 B) -3 C) 2 D) 3 E) 6
4. If $f(x) = \frac{\sqrt{x+2}}{\sqrt{x+3}}$, then $f'(1) = ?$
A) $\frac{3}{4}$ B) $\frac{3}{16}$ C) $\frac{5}{8}$ D) $\frac{5}{16}$ E) $\frac{1}{16}$
5. If $f(x) = -\frac{1}{x}$, then find $f''(x) = ?$
A) $2x^2$ B) $2x^{-3}$ C) $2[f(x)]^3$
D) $-2[f(x)]^{-3}$ E) $\frac{2}{x^4}$
6. Which one of the followings is the slope of the line that is tangent to the graph of the function $f(x) = 5x - x^2$ at the point A(2,6)?
A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$
7. If the curve $y = x^3 + 2$ and the line $y = mx$ are tangent, find m .
A) $\frac{1}{2}$ B) 1 C) 2 D) 3 E) 5
8. Find the equation of the line which is parallel to x-axis and tangent to the curve
 $f(x) = (x-3)(2x+1)$
A) $y = \frac{5}{4}$ B) $y = -\frac{49}{8}$ C) $y = x$
D) $y = \frac{57}{8}$ E) $y = \frac{5}{4}x$
9. Find the equation of the line that is tangent to the curve $x^2 - y^2 = 1$ at the point A(1,1)
A) $y = x$ B) $y = 2x$ C) $y = -x$
D) $y = 2x+1$ E) $y = x+2$
10. The function $y = f(x)$ is defined as $x^2 + 2xy - 3y^2 - 4x + 11 = 0$. Which one of the followings is the equation of the line that is tangent to the graph of the function at the point (2,-1)?
A) $2x - y - 3 = 0$ B) $x - 5y - 7 = 0$
C) $x + 3y - 1 = 0$ D) $2x - 3y - 7 = 0$
E) $3x - y + 4 = 0$
11. Find the equation of the line which is tangent to the curve $x^2y - 3xy - x + y + 3 = 0$ at the point $y = 1$.
A) $y = 1$ B) $y = x+1$ C) $y = x$
D) $y = -x$ E) $y = -x+1$
12. Find y'' for the implicit function $\sqrt{y} - \sqrt{x} = 2\sqrt{a}$ at the point A(a, a).
A) $\frac{1}{\sqrt{a}}$ B) 1 C) \sqrt{a} D) $\frac{1}{a}$ E) -1
13. If $y = u^2 + 2$ and $u = 2x^2 - x$, then find $\frac{dy}{dx}$.
A) $4x - 1$ B) $2(2x^2 - x)$
C) $(8x - 2)$ D) $2 \cdot (2x^2 - x) \cdot (4x - 1)$
E) $u \cdot (4x - 1)$

1. The function $f(x)$ is defined as

$$f(x) = \begin{cases} ax + b, & x > -1 \\ 4, & x = -1 \\ 2b, & x < -1 \end{cases}$$

If the function $f(x)$ is continuous at $x = -1$, then $a + b = ?$

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

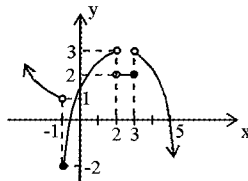
2. $f: \mathbb{R} \rightarrow \mathbb{R}, f(x) = \begin{cases} \frac{ax+2}{x}, & x < 2 \\ ax-1, & x \geq 2 \end{cases}$

If the function $f(x)$ is continuous at the point $x = 2$, what is the value of a ?

- A) 1 B) 2 C) 3 D) 4 E) 5

3. Which one of the followings is false ?

- A) $\lim_{x \rightarrow 1^-} f(x) = -2$
 B) $\lim_{x \rightarrow 3^+} f(x) = 3$
 C) The function $f(x)$ is continuous at $x = 1$.
 D) The function $f(x)$ is discontinuous at $x = 2$.
 E) The function $f(x)$ has a limit at $x = 3$, but not continuous



4. What is the value of real number a , if

$$f(x) = \frac{x^2 + 6}{x^2 + x - a} \text{ is discontinuous at } x = 2.$$

- A) -3 B) 0 C) 2 D) 3 E) 6

5. The function f is defined as $f(x) = \begin{cases} 2x - 3, & x > 0 \\ k - 1, & x = 0 \\ 2a + k, & x < 0 \end{cases}$.

If the function f is continuous at $x = 0$, find (a, k) .

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