Important Questions 2010
Class-XII- Maths
Limits & Derivatives

Evaluate:

Q.1. $\lim\limits_{x \to 0} \dfrac{x \tan 4x}{1 - \cos 4x}$

Q2. $\lim\limits_{x \to \frac{\pi}{2}} \dfrac{1 + \cos 2x}{(\pi - 2x)^2}$

Q.3. $\lim\limits_{x \to \frac{\pi}{4}} \dfrac{1 - \tan x}{x - \dfrac{\pi}{4}}$

Q3 $\lim\limits_{x \to 0} \dfrac{\sqrt{1+x} - \sqrt{1-x}}{\sin x}$

Q.4 $\lim\limits_{x \to \frac{\pi}{4}} \dfrac{\sin x - \cos x}{x - \dfrac{\pi}{4}}$

Q.5. $\lim\limits_{x \to \frac{\pi}{4}} \dfrac{\sin x - \cos x}{x - \dfrac{\pi}{4}}$

Q.6. $\lim\limits_{x \to 0} \dfrac{\sqrt{1+x} - \sqrt{1-x}}{x}$

Q.7 $\lim\limits_{x \to \pi} \dfrac{\sin 3x - 3\sin x}{(\pi - x)^3}$

Q.8. $\lim\limits_{x \to 0} \dfrac{\cosec x - \cot x}{x}$

Q.9. $\lim\limits_{x \to 0} \dfrac{ax + x \cos x}{b \sin x}$

Q.10. $\lim\limits_{x \to 2} \dfrac{3x^2 - x - 10}{x^2 - 4}$

Q.11. $\lim\limits_{x \to 2} \dfrac{e^x - e^2}{x - 2}$

Q.12. $\lim\limits_{x \to 0} \dfrac{e^x - 1}{\sqrt{1 - \cos x}}$

Q.13 . $\lim\limits_{x \to 0} \dfrac{\log(1 + x^3)}{\sin^3 x}$

Q.14 $\lim\limits_{x \to 0} \dfrac{e^x + e^{-x} - 2}{x^2}$

Q.15. $\lim\limits_{x \to 0} \dfrac{\sqrt{a+2x} - \sqrt{3x}}{\sqrt{3x+x} - 2\sqrt{x}}$

Q.16. $\lim\limits_{z \to 1} \dfrac{z^{1/3} - 1}{z^{1/6} - 1}$

Q.17 $\lim\limits_{x \to \frac{\pi}{2}} \dfrac{\tan 2x}{x - \dfrac{\pi}{2}}$

Q.18. $\lim\limits_{x \to 0} \dfrac{ax+b}{bx+a}$

Q.19. $\lim\limits_{x \to a} \dfrac{x^4 - a^4}{x - a}$

Q.20. $\lim\limits_{x \to 0} \dfrac{ax + b/x}{cx + d/x}$

Q.21. $\lim\limits_{x \to 1} \dfrac{3x^2 - 4x + 1}{x^2 - 4x + 3}$

Q.22. Evaluate: $\lim\limits_{x \to 0} \dfrac{(a+x)^2 \sin(a+x) - a^2 \sin a}{x}$

Q.23. Evaluate $\lim\limits_{x \to 0} f(x)$, where $f(x) = \dfrac{x - |x|}{x}, \; x \neq 0$

Q.24. Evaluate $\lim\limits_{x \to 2} f(x)$, where $f(x) = \dfrac{|x-2|}{x^2 - 4}, \; x \neq 2$

Q.25. Let f is defined by: $f(x) = \begin{cases} \dfrac{x^2}{2}, & if\ 0 \le x \le 1 \\ 2x^2 - 3x + \dfrac{3}{2}, & if\ 1 < x \le 2 \end{cases}$, Show that $\lim\limits_{x \to 1} f(x) = f(1)$

Q.26. Suppose $f(x) = \begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ b - ax, & x > 1 \end{cases}$ and if lim x-1 f(x)=f(1), what are the possible values of a nad b.

Q.27. If $\lim\limits_{x \to 1} f(x) = f(1)$. Find a and b so that the function f given by

$f(x) = \begin{cases} 3ax + b, & if\ x > 1 \\ 11, & if\ x = 1 \\ 5ax - 2b, & if\ x < 1 \end{cases}$

Q.28. Find the derivative of $f(x) = |x|^3 + |x|^2 \cdots |x| + 1$

Differentiate w.r.t. x :

Q.29. $y = \dfrac{1}{ax^2 + bx + c}$,

Q.30. $y = \dfrac{(ax^2 + \sin x)(p + q\cos x)}{}$

Q.31. $y = \dfrac{x^2 \cos\left(\dfrac{\pi}{4}\right)}{\sin x}$

Q.32. $y = (ax + b)^n (cx + d)^m$

Q. 33. $y = x^2 e^x \sin x$

Q.34. $y = e^x \left(x^3 + \sqrt{x}\right)$

Q.35. $y = \dfrac{x^2 + 5x - 6}{4x^2 - x + 3}$

Q.36. $y = \dfrac{x\tan x}{\sec x + \tan x}$

Q.37. If $y = \sqrt{x} + \dfrac{1}{\sqrt{x}}$, show that $2x\dfrac{dy}{dx} + y = 2\sqrt{x}$

Q.38. If y = x sinx, prove that $\dfrac{1}{y}\dfrac{dy}{dx} = \dfrac{1}{x} + \cot x$

Q.39. If $y = \dfrac{y}{x + a}$, prove that $x\dfrac{dy}{dx} = y(1 - y)$

Q.40. If $f(x) = Kx^2 + Mx + 12$, $f'(4) = 15$ and $f'(2) = 11$, find the values of K and M.

Q.41. If $f(x) = x^2 - 6x + 8$, prove that $f'(5) - 3f'(2) = f'(8)$

Q.42. If y = x tanx, prove that $x\sin^2 x\dfrac{dy}{dx} = y^2 + y\sin^2 x$

Q.43. If $y = \dfrac{\cos x - \sin x}{\cos x + \sin x}$, show that $\dfrac{dy}{dx} + y^2 + 1 = 0$

Q.44. If $y = \dfrac{\cos x + \sin x}{\cos x - \sin x}$, show that $\dfrac{dy}{dx} = \sec^2\left(x + \dfrac{\pi}{4}\right)$

Q.45. Find the derivative of the function $f(x) = 2x^2 + 3x - 5 \ at \ x = -1$. Also show that $f'(0) + 3f'(-1) = 0$.