J.E.E. Main/ Advanced Foundation - XI Maths Worksheet

Time: 60 min **Chapter#13. Limits and Derivatives** **Full Marks:**

Q.1 Find the derivative of (x + sec x) (x - tanx). (2 marks)

Q.2 Find the derivative of the following function : x^4 (5 sin x – 3 cos x). (3 marks)

Q.3 Find the derivative of $(x^2 + 1)$ cos x. (3 marks)

Q.4 Evaluate the given limit: $\lim_{x \to 0} \frac{ax + x \cos x}{b \sin x}$. (3 marks)

Q.5 **Find the derivative of** $\frac{\sin x + \cos x}{\sin x - \cos x}$.

Q.6 Evaluate the Given limit: $\lim_{x \to 0} \frac{3x^2 - x - 10}{x^2 - 4}$. (3 marks)

Q.7 Evaluate the given limit: $\lim_{x \to 1} \frac{ax^2 + bx + c}{cx^2 + bx + a}, a + b + c \neq 0$. (1 mark)

Q.8 Find the value of the limit $\lim_{x \to 3} \frac{x^2 + 10}{x - 2}$. (1 mark)

Q.9 Find the value of $\lim_{x \to 0} \frac{e^x - 1}{10x}$. (1 mark)

Q.10 Find the first derivative of x^3 - 4 at x = 2. (1 mark)

Q.11 Evaluate the given limit: $\lim_{x \to 0} \frac{ax + b}{cx + 1}$. (1 mark)

Q.12 Find the derivative of x^2 sin x. (1 mark)

Q.13 Find the value of $\lim_{x \to 0} \frac{2 \log(1 + x)}{3x}$. (2 marks)

Q.14 Find the derivative of the following function $\frac{x^2 \cos\left(\frac{\pi}{4}\right)}{\sin x}$. (3 marks)

Q.15 Find the derivative of $x^2 + \sin x + \frac{1}{x^2}$. (2 marks)

Q.16 Suppose $f(x) = \begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ b - ax & x > 1 \end{cases}$ and if $\lim_{x \to 1} f(x) = f(1)$ what are possible values of a and b? (5 marks)

Q.17 For some constants a and b, find the derivative of $(ax + b)^2$. (2 marks)

Q.18 Evaluate $\lim_{x \to 0} \frac{\tan 4x}{x \sec x}$. (2 marks)

Q.19 Find the derivative of cos x from first principle. (3 marks)

Q.20 **Evaluate:** $\lim_{x \to 0} (\text{cosec } x - \cot x)$.