

Worksheet: Limits and Derivatives

ISC · Class 11 · Mathematics · 10 questions · 37 marks

Name: _____

Date: _____

Score: _____ / 37

Q1. Evaluate $\lim_{x \rightarrow 2} (x^2 - 4)/(x - 2)$. [2 marks]

Q2. Evaluate $\lim_{x \rightarrow 0} \sin(5x)/\sin(3x)$. [3 marks]

Q3. For $f(x) = 3x + 1$ if $x < 2$, and $f(x) = x^2 + 3$ if $x \geq 2$, determine whether $\lim_{x \rightarrow 2} f(x)$ exists. [3 marks]

Q4. Find the derivative of $f(x) = x^3$ from first principles. [4 marks]

Q5. Find the derivative of $f(x) = \sqrt{x}$ from first principles (for $x > 0$). [4 marks]

Q6. Evaluate $\lim_{x \rightarrow 0} (e^{3x} - 1)/x$, using the standard exponential limit. [3 marks]

Q7. Differentiate $y = x^2 \sin(x)$ using the product rule, then evaluate dy/dx at $x = \pi/2$. [5 marks]

Q8. Differentiate $y = (x^2 + 1)/(x - 1)$ using the quotient rule. [5 marks]

Q9. Differentiate $y = \sec(x)$ using the quotient rule on $1/\cos(x)$. [4 marks]

Q10. Differentiate $f(x) = (3x + 2)^5$ using the first-principles substitution technique (without invoking a general chain rule). [4 marks]
