1. Precisely define \( \lim_{x \to a} f(x) = L \) using inequalities in terms of \( \delta \) and \( \epsilon \).

2. Define the derivative \( f'(x) \) of a function \( f(x) \) using limits.

3. Suppose \( x \sin y + y \sin x = 3 \). Find \( dy/dx \) by implicit differentiation.

4. Define the integral \( \int_a^b f(x) \, dx \) of a function \( f(x) \) using limits.

5. Find the following limits:
   (i) \( \lim_{x \to 2} \frac{x^2 - x - 2}{x - 2} \)
   (ii) \( \lim_{x \to \infty} \frac{x^2 + x - 3}{2x^2 - 4} \)
   (iii) \( \lim_{t \to 0} \frac{1 - e^{-t}}{t} \)

6. Find the following derivatives:
   (i) \( \frac{d}{dx} \arctan(2x) \)
   (ii) \( \frac{d}{dx} \left( \frac{x}{x^2 + 7} \right) \)
   (iii) \( \frac{d}{dx} |x|^{3x} \)

7. Find the following antiderivatives:
   (i) \( \int (5x^3 - 2x^2) \, dx \)
   (ii) \( \int x^2 \cos(x^3 + 1) \, dx \)
   (iii) \( \int x \sqrt{x + 1} \, dx \)

8. Compute the following areas:
   (i) \( \int_1^2 x^2 \, dx \)
   (ii) \( \int_0^{\pi/2} \sin 2x \, dx \)
   (iii) \( \int_1^3 \frac{1}{x + 1} \, dx \)
9. Solve the following story problems:

(i) The length of a rectangle is increasing at a rate of 7 cm/s and its width is increasing at a rate of 6 cm/s. When the length is 15 cm and the width is 6 cm, how fast is the area of the rectangle increasing?

(ii) A street light is mounted at the top of a 15-ft-tall pole. A man 6 ft tall walks away from the pole with a speed of 4 ft/s along a straight path. How fast is the tip of his shadow moving when he is 35 ft from the pole?

(iii) A rectangular storage container with an open top is to have a volume of 10 m³. The length of this base is twice the width. Material for the base costs $10 per square meter. Material for the sides costs $6 per square meter. Find the cost of materials for the cheapest such container.

10. Answer the following true/false questions:

(i) If \( f \) is differentiable at \( a \), then \( f \) is continuous at \( a \).

(ii) If \( f \) is continuous on \([a, b]\), then the integral \( \int_{a}^{b} f(x) \, dx \) exists.

(iii) \( \lim_{\theta \to 0} \frac{\sin \theta}{\theta} = 1 \).