This part of the exam has 8 problems; each problem is worth 10 points.

You may NOT use a calculator on this section. You must show all work, but you need not simplify your answers. This part of the exam will be collected after 40 minutes.

Question 1: ______
Question 2: ______
Question 3: ______
Question 4: ______
Question 5: ______
Question 6: ______
Question 7: ______
Question 8: ______

80 Total Points: ______
Question 1 (10 points, 1.3). Find the limit:
\[ \lim_{{x \to -3}} \frac{x^2 + 5x + 6}{x^2 - x - 12} \]

Question 2 (10 points, 1.4). Find the limit:
\[ \lim_{{x \to 0}} \frac{\sin 3x}{x} \]
Question 3 (10 points, 1.5). Evaluate the following limit at \( \infty \).

\[
\lim_{x \to \infty} \frac{3x^2 - 1}{4 - x^2}
\]

Question 4 (10 points, 2.2). Let \( f(x) = x^2 - 1 \). Use the definition of the derivative, as a limit of a quotient, to find \( f'(2) \).
**Question 5** (10 points, 2.3). *Find the equation of the tangent line to the curve* \( y = \frac{2x + 1}{x^2 + 1} \) *at the point* \((0,1)\).

**Question 6** (10 points, 2.4). *Find the derivative of the function* \( f(x) = \tan x(1 - \sin x) \).
Question 7 (10 points, 2.5). Find the derivative of $\sin 2x - 3 \cos^2 x$.

Question 8 (10 points, 2.7). Assuming the equation defines a differentiable function of $x$, find $D_{xy}$ by implicit differentiation:

$$x^2 + 2x^2 y + 3xy = 0$$