

1. Use the limit laws to calculate the following limits – show each step:

$$\lim_{x \rightarrow 3} 2x^3 - x + 1$$

$$\lim_{x \rightarrow 1} \frac{x^2 + 1}{\sqrt{2x + 4}}$$

$$\lim_{x \rightarrow -2} \frac{x^2 - 4}{x + 2}$$

$$\lim_{t \rightarrow 0} \frac{\sqrt{t^2 + 4} - 2}{t}$$

2. Consider the function

$$f(x) = \begin{cases} x^2 + 1 & x \leq 2 \\ a - 3x & x > 2. \end{cases}$$

For what value of a does $\lim_{x \rightarrow 2} f(x)$ exist?

3. Determine the following limits using the Squeeze Theorem – explain all steps:

$$\lim_{x \rightarrow \infty} \frac{\cos(x^2 + 1)}{x}$$

$$\lim_{x \rightarrow 0} \frac{x^4}{\sec(x)}$$

$$\lim_{x \rightarrow 0} x^2 e^{\sin(1/x)}$$