

Question 10

Evaluate the limit:

$$\lim_{x \rightarrow \infty} \frac{5x^2 + 3x - 7}{2x^2 - x + 4}$$

Question 10 - Solution

We are given:

$$\lim_{x \rightarrow \infty} \frac{5x^2 + 3x - 7}{2x^2 - x + 4}$$

Step 1: Factor out the highest power of x (which is x^2) from both the numerator and denominator:

$$= \lim_{x \rightarrow \infty} \frac{x^2 \left(5 + \frac{3}{x} - \frac{7}{x^2}\right)}{x^2 \left(2 - \frac{1}{x} + \frac{4}{x^2}\right)}$$

Step 2: Cancel the common factor x^2 :

$$= \lim_{x \rightarrow \infty} \frac{5 + \frac{3}{x} - \frac{7}{x^2}}{2 - \frac{1}{x} + \frac{4}{x^2}}$$

Step 3: Take the limit as $x \rightarrow \infty$. Terms with $\frac{1}{x^n} \rightarrow 0$:

$$= \frac{5 + 0 - 0}{2 - 0 + 0} = \boxed{\frac{5}{2}}$$