

## JEE Main Maths Limits, Continuity and Differentiability Previous Year Questions With Solutions

**Question 1:** Solve

$$\lim_{x \rightarrow 1} \frac{(2x-3)(\sqrt{x}-1)}{2x^2+x-3}$$

**Solution:**

$$\begin{aligned}\lim_{x \rightarrow 1} \frac{(2x-3)(\sqrt{x}-1) \times (\sqrt{x}+1)}{(x-1)(2x+3) \times (\sqrt{x}+1)} \\ &= \frac{-1}{5 \cdot 2} \\ &= \frac{-1}{10}\end{aligned}$$

**Question 2:** If  $f(9)=9$ ,  $f'(9)=4$ , then

$$\lim_{x \rightarrow 9} \frac{\sqrt{f(x)}-3}{\sqrt{x}-3}$$

**Solution:**

Applying L - Hospitals rule,

$$\begin{aligned}\lim_{x \rightarrow 9} \frac{\frac{1}{2\sqrt{f(x)}} \cdot f'(x)}{\frac{1}{2\sqrt{x}}} \\ &= \frac{f'(9)}{\sqrt{f(9)}} \\ &= \frac{4}{\sqrt{9}} \\ &= \frac{4}{3}\end{aligned}$$

**Question 3:** Solve

$$\lim_{h \rightarrow 0} \frac{(a+h)^2 \sin(a+h) - a^2 \sin a}{h}$$

**Solution:**

Apply L-Hospitals rule,

$$\lim_{h \rightarrow 0} \frac{(a+h)^2 \sin(a+h) - a^2 \sin a}{h}$$