CHAPTER 13. LIMITS & DERIVATIVES

Focus Area Based Practice Questions

1. (a) $\lim\limits_{x \to a} \dfrac{x^n - a^n}{x - a} = $ ....

   (b) $\lim\limits_{x \to 0} \dfrac{x^{10} - 1024}{x^5 - 32}$

2. (a) Find $\lim\limits_{x \to 0} \dfrac{\sin 10x}{x}$

   (b) Find $\lim\limits_{x \to 0} \dfrac{\sin ax}{\sin bx}$

3. Find $\lim\limits_{x \to 1} f(x)$ where $f(x) = \begin{cases} x^2 - 1, & x \leq 1 \\ -x^2 - 1, & x > 1 \end{cases}$

4. Evaluate $\lim\limits_{x \to 2} \dfrac{x^2 - 5x + 6}{x^2 - 4}$

5. $\lim\limits_{x \to 0} \dfrac{\sin 5x}{2x}$

6. (a) $\dfrac{d}{dx}(x^n) = $ ....

   (b) Find the derivative of $\dfrac{3x^2 + 4}{2x}$ with respect to x.

7. (a) Evaluate $\lim\limits_{x \to -1} \dfrac{x^{10} + 5x + 6}{2x^2 - 3}$

   (b) If $f(x) = \begin{cases} 2x + 3, & x \leq 0 \\ 3(x + 1), & x > 0 \end{cases}$, then find

   $\lim\limits_{x \to 1} f(x)$, $\lim\limits_{x \to 0} f(x)$

8. (a) Find $\dfrac{d}{dx}(9 + sinx)$

(b) Find $\dfrac{dy}{dx}$ **if** $y = \dfrac{4+5\ sinx}{3+7\ cosx}$

9. Find the derivative of $x.sinx$ **with respect to x.**

10. Find the derivative of $\dfrac{ax+b}{cx+d}$ **w.r.t x .**

11. Find the derivatives of (i) $\dfrac{1+tanx}{1-tanx}$

(ii) x^{-3}(5+3x)   w.r.to x

12. Evaluate (a) $\lim\limits_{x\to 3}\dfrac{x^4-81}{2x^2-5x-3}$ **(b)** $\lim\limits_{x\to 2}\dfrac{3x^2-x-10}{x^2-4}$