

If  $f(x) = x^n$ , then the value of

**[2003]**

$$f(1) - \frac{f'(1)}{1!} + \frac{f''(1)}{2!} - \frac{f'''(1)}{3!} + \dots + \frac{(-1)^n f^n(1)}{n!} \text{ is}$$

- (a) 1                      (b)  $2^n$                       (c)  $2^n - 1$                       (d) 0

**(d)**  $f(x) = x^n \Rightarrow f(1) = 1$

$$f'(x) = nx^{n-1} \Rightarrow f'(1) = n$$

$$f''(x) = n(n-1)x^{n-2} \Rightarrow f''(1) = n(n-1)$$

.....

$$\dots\dots\dots f^n(x) = n! \Rightarrow f^n(1) = n!$$

$$= 1 - \frac{n}{1!} + \frac{n(n-1)}{2!} - \frac{n(n-1)(n-2)}{3!} + \dots + (-1)^n \frac{n!}{n!}$$

$$= {}^n C_0 - {}^n C_1 + {}^n C_2 - {}^n C_3 + \dots + (-1)^n {}^n C_n = 0$$