

$$f(x) = \begin{cases} 0, & x \leq -1 \\ \sqrt{1-x^2}, & -1 < x < 1 \\ x, & 1 \leq x \end{cases}$$

$$y = \sqrt{x} + \frac{1}{x} \quad (1)$$

$$\lim_{x \rightarrow 1} \left(\frac{x}{1-x} - \frac{1}{\ln x} \right) = \frac{1}{2} \quad (2)$$

$$f(x) = \begin{cases} x & \text{when } 0 \leq x < \frac{1}{2} \\ 1-x & \text{when } \frac{1}{2} \leq x < 1 \end{cases}$$

$$y = \frac{e^{x^2} \tan^{-1} x}{\sqrt{1+x^2}} \quad (3)$$

$$y = \cos^{-1}(\sin(ax^2 + bx + c)) \quad (4)$$

$$y = x^{x^x} \quad (5)$$

$$y = x^x + x^{\frac{1}{x}} \quad (6)$$

$$f(x) = \begin{cases} \frac{1}{(x+2)}, & x < -2 \\ x^2 - 5, & -2 < x \leq 3 \\ \sqrt{x+13}, & x > 3 \end{cases}$$

$$\tan^{-1} \frac{\sqrt{1+x^2} - 1}{x} \quad (7)$$

$$f(x) = x^3 - 10x^2 + 6 \quad (8)$$

$$y = e^{k \sin^{-1} x} \quad (9)$$

$$(1-x^2)y_2 - xy_1 - k^2y = 0 \quad (10)$$

$$(1-x^2)y_{n+2} - (2n+1)xy_{n+1} - (n^2+k^2)y_n = 0 \quad (11)$$

SECTION-B

$$\phi''(x) = \cos^2 x + 5 \quad (12)$$

$$\int \frac{x^2 + 4}{x^2 + 2x + 3} dx \quad (13)$$

$$\int \frac{1}{\sqrt{(x-4)(6-x)}} dx \quad (14)$$

$$\int \frac{1}{(x^2 + 1)(\sqrt{x^2 + 4})} dx \quad (15)$$

$$\int_a^b f(x) dx. \quad (16)$$

$$\int_0^{\frac{2\pi}{3}} \frac{dx}{5 + 4\cos x} \quad (17)$$

$$\frac{dy}{dx} = x(y^2 + 1)$$

$$\frac{1000}{P} \frac{dP}{dt} = 100 - P \quad (18)$$

²This is a sample equation from Math Question