

$$(O) \frac{\sum fx}{\sum f}$$

$$(P) \frac{\sum f |x - \bar{x}|}{\sum f}$$

$$(Q) 7, 9, 10, 12, 12, 17$$

$$\text{Median} = \frac{10+12}{2} = \frac{22}{2} = 11$$

$$(R) s = \sqrt{\frac{6\sum d^2}{n(n^2-1)}}$$

$$(i) \int \frac{dx}{x^2+a^2} = \frac{1}{a} \tan^{-1} \frac{x}{a} + c.$$

$$(j) \int_0^{\pi/4} \sin x \, dx = \left[ -\cos x \right]_0^{\pi/4} = \left[ \cos x \right]_{\pi/4}^0 \\ = \cos 0 - \cos \frac{\pi}{4} \\ = 1 - \frac{1}{\sqrt{2}}$$

$$(k) \frac{h}{2} \left[ (y_1 + y_{n+1}) + 2(y_2 + y_3 + \dots + y_n) \right]$$

$$(l) \frac{dy}{dx} = \frac{x}{y}$$

$$(m) \frac{dy}{dx} = \sin(x)$$

$$dy = \sin x \, dx$$

$$y = -\cos x + c$$

$$y + \cos x = c$$

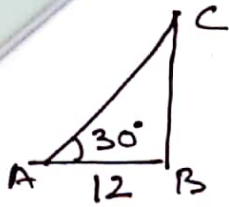
$$(n) y = A \cos x$$

$$\frac{dy}{dx} = -A \sin x$$

$$\frac{d^2y}{dx^2} = -A \cos x$$

$$\frac{d^2y}{dx^2} = -y$$

$$\frac{d^2y}{dx^2} + y = 0$$



$$\therefore \frac{BC}{AB} = \tan 30^\circ$$

$$BC = AB \tan 30^\circ$$

$$= 12 \times \frac{1}{\sqrt{3}} = 4\sqrt{3}$$

$$(9) (x-x_1)(x-x_2) + (y-y_1)(y-y_2) = 0$$

$$(2) \text{ centre } \left(\frac{3}{2}, 0\right)$$

$$(g) (x+2)^{-7} = \infty$$

$$(h) \text{ Minor of } a_{21} = -4$$

$$\text{Minor of } a_{22} = 3$$

$$(i) \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$(j) A' = \begin{bmatrix} 1 & 1 \\ 4 & 9 \\ 5 & -1 \\ 3 & 4 \end{bmatrix}$$

$$(k) \cos 50 \cos 10 - \sin 50 \sin 10 \\ \cos(50+10) \\ \cos 60^\circ \\ \frac{1}{2}$$

$$(l) \sin 140 + \sin 20 \\ 2 \sin\left(\frac{140+20}{2}\right) \cos\left(\frac{140-20}{2}\right) \\ 2 \sin 80 \cos 60$$

$$(m) \frac{3\pi}{2} = \frac{3 \times 180}{2} = 270^\circ$$

$$(n) r = \sqrt{(-1)^2 + (1)^2} = \sqrt{1+1} = \sqrt{2} \\ \theta = \tan^{-1}\left(\frac{1}{-1}\right) = \tan^{-1}(-1) \\ = \tan^{-1}(\tan 135^\circ) \\ \therefore \theta = 135^\circ$$

$$(o) \text{ slope}(m) = \frac{-1-5}{3-7} = \frac{-6}{-4} = \frac{3}{2}$$

# APPLIED MATHEMATICS

$$Q.1 (a) \lim_{x \rightarrow 2} \frac{\sqrt{x} - \sqrt{2}}{x - 2} = \text{?}$$

$$= \lim_{x \rightarrow 2} \frac{(\sqrt{x} - \sqrt{2})}{(\sqrt{x} - \sqrt{2})(\sqrt{x} + \sqrt{2})}$$

$$= \lim_{x \rightarrow 2} \frac{1}{\sqrt{x} + \sqrt{2}} = \frac{1}{\sqrt{2} + \sqrt{2}} = \frac{1}{2\sqrt{2}}$$

$$(b) \lim_{x \rightarrow 0} \frac{\sin 3x}{x} = \lim_{x \rightarrow 0} \frac{\sin 3x}{3x} \times 3$$

$$= 1 \times 3$$

$$= 3$$

$$(c) \frac{d}{dx} x \sin x$$

$$= x \cos x + \sin x$$

$$(d) \frac{d}{dx} \tan^{-1} x = \frac{1}{1+x^2}$$

$$(e) \frac{d}{dx} (UV) = u \frac{dv}{dx} + v \frac{du}{dx}$$

$$(f) \frac{d^2 y}{dx^2} = 0$$

$$(g) \int \frac{1}{x^7} dx = \int x^{-7} dx = \frac{x^{-6}}{-6} + C$$

$$(h) \int \frac{3x^2}{x^3+1} dx = \log(x^3+1) + C$$

# Applied Mathematics

①

## SECTION A

Q. 1.

$$(a) \frac{5i}{3}$$

$$(b) \text{Mod} = \sqrt{(-2)^2 + (3)^2} = \sqrt{4+9} = \sqrt{13}$$

$$\text{Conjugate} = -2-3i$$

$$(c) \log_{10}(x+2) = 1$$

$$\log_{10}(x+2) = \log_{10} 10$$

$$\therefore x+2 = 10$$

$$x = 8$$

$$(d) \log_4 256 = x$$

$$\log_4 4^4 = x$$

$$4 \log_4 4 = x$$

$$4 = x$$

$$(e) 3! + 5!$$

$$= 3 \times 2 \times 1 + 5 \times 4 \times 3 \times 2 \times 1$$

$$= 6 + 120$$

$$= 126$$

$$(f) {}^{10}P_2 = \frac{10!}{8!} = \frac{10 \times 9 \times 8!}{8!}$$

$$= 90$$