01. (i) [illegible] $f(x) = 0$ [illegible]

$\alpha + \beta = -2$ [illegible] $\alpha\beta = 9$ [illegible]

$\alpha^2 - 1 = \gamma$ [illegible] $\beta^2 - 1 = \delta$ [illegible]

$$\gamma + \delta = (\alpha^2 - 1) + (\beta^2 - 1)$$
$$= \alpha^2 + \beta^2 - 2$$
$$= (\alpha + \beta)^2 - 2\alpha\beta - 2$$
$$= (-2)^2 - 2.9 - 2$$
$$= -16$$

$$\gamma\delta = (\alpha^2 - 1)(\beta^2 - 1)$$
$$= \alpha^2\beta^2 - (\alpha^2 + \beta^2) + 1$$
$$= (\alpha\beta)^2 - [(\alpha + \beta)^2 - 2\alpha\beta] + 1$$
$$= 81 - [(-2)^2 - 2.9] + 1$$
$$= 96$$

$\therefore$ [illegible]

$(x - \gamma)(x - \delta) = 0$

$\Rightarrow x^2 - (\gamma + \delta)x + \gamma\delta = 0$

$x^2 + 16x + 96 = 0$ //

(ii) $f(x) = k \Rightarrow x^2 + 2x + 9 = k$

$\Rightarrow x^2 + 2x + 9 - k = 0$

[illegible]

$\Delta = 0$

[illegible] $4 - 4.1.(9 - k) = 0$

$\Rightarrow 9 - k = 1 \Rightarrow k = 8$ //

(iii) $\dfrac{1}{f(x)} = \dfrac{1}{x^2 + 2x + 9} = \dfrac{1}{(x + 1)^2 + 8}$

[illegible] $x + 1 = 0$ [illegible]

[illegible] $x = -1$ [illegible]

$\therefore$ [illegible] $= \dfrac{1}{8}$ //

(iv) $f(x) = \lambda x$ [illegible] $x^2 + 2x + 9 = \lambda x$

$\Rightarrow x^2 + (2 - \lambda)x + 9 = 0$

[illegible] $(2 - \lambda)^2 - 36 < 0$ [illegible]

[illegible] $(\lambda + 4)(8 - \lambda) > 0$

$\therefore$ [illegible] λ [illegible]

$= \{\lambda \in \mathbb{R} ; -4 < \lambda < 8\}$ //

02. (a) [illegible]

$$= {}^{12}C_4$$
$$= \frac{12!}{4!\,8!}$$
$$= \frac{\cancel{12}^{3} \times 11 \times \cancel{10}^{5} \times \cancel{9}^{3} \times \cancel{8!}}{\cancel{4}_{1} \times \cancel{3}_{1} \times \cancel{2} \times 1 \times \cancel{8!}}$$
$$= \underline{495}$$

(i) [illegible]

$\therefore$ [illegible]

$$= {}^{10}C_2$$
$$= \frac{10!}{2!\,8!}$$
$$= \frac{\cancel{10}^{5} \times 9 \times \cancel{8!}}{\cancel{2} \times 1 \times \cancel{8!}}$$
$$= 45$$

(ii) [illegible]

[illegible]

$$= {}^{10}C_3 + {}^{10}C_3$$
$$= \frac{10!}{3!\,7!} + \frac{10!}{3!\,7!}$$
$$= \frac{10 \times \cancel{9}^{3} \times 8 \times \cancel{7!}}{\cancel{3} \times \cancel{2} \times 1 \times \cancel{7!}} \times \cancel{2}$$
$$= \underline{240}$$

(iii) [illegible]

[illegible]

$$= {}^{10}C_4$$
$$= \frac{10!}{4!\,6!}$$
$$= \frac{10 \times \cancel{9}^{3} \times \cancel{8}^{1} \times 7 \times \cancel{6!}}{\cancel{4} \times \cancel{3} \times \cancel{2}_{1} \times 1 \times \cancel{6!}}$$
$$= \underline{210}$$

(b) (i) $\left(\dfrac{7}{6x} - \dfrac{6x}{7}\right)^{13}$

$$= \sum_{r=0}^{13} {}^{13}C_r \left(\frac{7}{6x}\right)^{13-r} \left(-\frac{6x}{7}\right)^{r}$$
$$= \sum_{r=0}^{13} {}^{13}C_r (-1)^r \left(\frac{7}{6}\right)^{13-2r} x^{2r-13}$$

r [illegible] $2r - 13$ [illegible] x [illegible] $\frac{1}{x}$ [illegible]

(ii) $\frac{1}{x}$ [illegible]

$2r - 13 = -1$ [illegible] $r = 6$ [illegible]

[illegible] $\frac{1}{x}$ [illegible]

$$= {}^{13}C_6 (-1)^6 \left(\frac{7}{6}\right)^{13-12}$$
$$= \frac{13!}{7!\,6!} \times 1 \times \frac{7}{6}$$
$$= \frac{13 \times \cancel{12}^{1} \times 11 \times \cancel{10}^{2} \times \cancel{9} \times \cancel{8} \times \cancel{7!}}{\cancel{6} \times \cancel{5} \times \cancel{4} \times \cancel{3} \times \cancel{2} \times 1 \times \cancel{7!}} \times \frac{7}{\cancel{6}}$$
$$= 13 \times 11 \times 2 \times 7$$
$$= \underline{2002}$$

03. (a) [illegible] n [illegible]

$S(n) : n! \geq 2^{n-1}$ [illegible]

$1! = 1$ [illegible] $2^{1-1} = 2^0 = 1$ [illegible] $n = 1$ [illegible]

$S(1)$ [illegible]

$S(k)$ [illegible] k [illegible]

[illegible] $k! \geq 2^{k-1}$

[illegible]

$(k + 1)! = k!\,(k + 1) \geq$

$2^{k-1}(k + 1) \geq 2^{k-1}.2 = 2^k$

$(\because k \geq 1$ [illegible] $k + 1 \geq 2)$

[illegible]

$(k + 1)! \geq 2^{(k+1)-1}$

[illegible] $S(k + 1)$ [illegible]

[illegible] n [illegible] $S(n)$ [illegible] //

[illegible] n [illegible] $\dfrac{1}{n!} \leq \dfrac{1}{2^{n-1}}$ [illegible]

$(\because n! \geq 2^{n-1}$ [illegible]$)$

$$\therefore \sum_{k=1}^{n} \frac{1}{k!} \leq \sum_{k=1}^{n} \frac{1}{2^{k-1}}$$

$$\sum_{k=1}^{n} \frac{1}{2^{k-1}} = \frac{1 - \left(\frac{1}{2}\right)^n}{1 - \left(\frac{1}{2}\right)} = 2 - 2\left(\frac{1}{2}\right)^n$$
$$= 2 - \left(\frac{1}{2}\right)^{n-1}$$
$$\therefore \sum_{k=1}^{n} \frac{1}{k!} \leq 2 - \frac{1}{2^{n-1}}$$ //

[illegible]

$$e = \lim_{n \to \infty} \sum_{k=0}^{n} \frac{1}{k!}$$
$$= \lim_{n \to \infty} \left[1 + \sum_{k=1}^{n} \frac{1}{k!}\right]$$
$$= 1 + \lim_{n \to \infty} \sum_{k=1}^{n} \frac{1}{k!}$$
$$\leq 1 + \lim_{n \to \infty} \left[2 - \frac{1}{2^{n-1}}\right]$$
$$= 1 + 2 - \lim_{n \to \infty} \left[\frac{1}{2^{n-1}}\right]$$
$$\leq 3$$ //

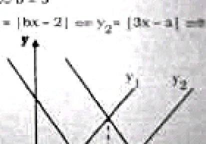
(b)

[illegible] a [illegible] b [illegible] I U III [illegible] II [illegible]

[illegible] $(4/3, \infty)$ [illegible]

[illegible] $b = 3$

$y_1 = |bx - 2|$ [illegible] $y_2 = |3x - a|$ [illegible]



$y_1 = y_2$, $x = 4/3$ [illegible]

$bx - 2 = -(3x - a)$; $x = \dfrac{4}{3}$ [illegible]

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[illegible]

$a = (b+3)x - 2$

$b = 3$ ස $x = \frac{4}{3}$ විට

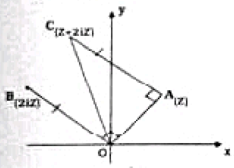
$a = 6 \times \frac{4}{3} - 2 = 6$

$\therefore$ [illegible]

a ස b [illegible]

$a = 6,\ b = 3$ [illegible]

04.



$2iz$ [illegible] OA [illegible] $2|OA|$ [illegible] B [illegible]

$z + 2iz$ [illegible]

OB [illegible] A [illegible] AC [illegible] C [illegible]

$A\hat{O}B = \frac{\pi}{2}$ [illegible] $\tan A\hat{O}C = \frac{AC}{OA}$

$= \frac{2}{1} = 2$

(i) C [illegible]

$\arg(z) = \frac{\pi}{2} - A\hat{O}C$

[illegible]

$\frac{y}{x} = \tan\left(\frac{\pi}{2} - A\hat{O}C\right) = \cot A\hat{O}C$

$= \frac{1}{2}$

$\therefore x - 2y = 0$ //

(ii) $y = 2x$ [illegible] $\arg(z) = \tan^{-1}(2)$

[illegible]

$\arg(z + 2iz)$

$= \arg z(1 + 2i)$

$= \arg z + \arg(1 + 2i)$

$= \tan^{-1}(2) + \tan^{-1}(2)$

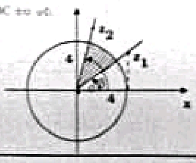
$= 2\tan^{-1}(2)$

$= 2\arg(z)$

$= \arg(z^2)$

$\therefore z^2$ OC [illegible]

(iii)



[illegible] β [illegible]

$\arg z_2 = \tan^{-1}(2) \Rightarrow$

$\arg(z_1) = \tan^{-1}\frac{1}{2}$ [illegible]

[illegible]

$\beta - \alpha = \theta$ [illegible]

$\tan\theta = \tan(\beta - \alpha)$

$= \frac{\tan\beta - \tan\alpha}{1 + \tan\beta\tan\alpha}$

$= \frac{2 - \frac{1}{2}}{1 + 2 \cdot \frac{1}{2}} = \frac{\frac{3}{2}}{2} = \frac{3}{4}$

$\therefore \theta = \tan^{-1}\left(\frac{3}{4}\right)$

[illegible]

$= \frac{1}{2}\theta r^2 = \frac{1}{2} \cdot 4^2 \tan^{-1}\left(\frac{3}{4}\right)$

$= 8\tan^{-1}\left(\frac{3}{4}\right)$ //

05. (a) $y = e^{4x}\sin 3x$

$\Rightarrow \frac{dy}{dx} = e^{4x}.3\cos 3x + \sin 3x.4e^{4x}$

$= 3e^{4x}\cos 3x + 4y$ — ①

$\frac{d^2y}{dx^2} = 3e^{4x}(-3\sin 3x)$

$+ 3\cos 3x\,4e^{4x} + 4\frac{dy}{dx}$

$= -9e^{4x}\sin 3x + 12e^{4x}\cos 3x$

$+ 4\frac{dy}{dx}$

$= -9y + 4\frac{dy}{dx} - 16y + 4\frac{dy}{dx}$

$= 8\frac{dy}{dx} - 25y$

$\Rightarrow \frac{d^2y}{dx^2} - 8\frac{dy}{dx} + 25y = 0$ // — ②

② [illegible] x [illegible]

$\frac{d^3y}{dx^3} - 8\frac{d^2y}{dx^2} + 25\frac{dy}{dx} = 0$ — ③

$x = 0$ විට ① න්

$\left(\frac{dy}{dx}\right)_{x=0} = 3.e^0.\cos 0 + 0 = 3$ //

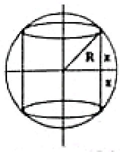
② න් $\left(\frac{d^2y}{dx^2}\right)_{x=0} - 8.3 + 25.0 = 0$

$\left(\frac{d^2y}{dx^2}\right)_{x=0} = 24$ //

③ න් $\left(\frac{d^3y}{dx^3}\right)_{x=0} - 8 \times 24 + 25 \times 3 = 0$

$\left(\frac{d^3y}{dx^3}\right)_{x=0} = 192 - 75 = 117$ //

(b)



[illegible] R [illegible] 2x [illegible] V(x) [illegible]

$V(x) = \pi(R^2 - x^2)2x$

$= 2\pi(R^2 - x^2)x$

[illegible]

$V'(x) = 2\pi[R^2 - x^2 + x(-2x)]$

$= 2\pi(R^2 - 3x^2)$

$= 6\pi\left[\frac{R^2}{3} - x^2\right]$

$= 6\pi\left[\frac{R}{\sqrt{3}} - x\right]\left[\frac{R}{\sqrt{3}} + x\right]$

$x > 0$ [illegible] $V'(x) = 0$ විට $x = \frac{R}{\sqrt{3}}$

$x < \frac{R}{\sqrt{3}}$ විට $V'(x) > 0$

$x > \frac{R}{\sqrt{3}}$ විට $V'(x) < 0$

[illegible] $x = \frac{R}{\sqrt{3}}$ විට V(x) [illegible]

$\therefore$ [illegible] $= V\left(\frac{R}{\sqrt{3}}\right)$

$= 2\pi\left[R^2 - \frac{R^2}{3}\right]\frac{R}{\sqrt{3}}$

$= \frac{4\pi R^3}{3\sqrt{3}} = \frac{1}{\sqrt{3}}\left(\frac{4\pi R^3}{3}\right)$

$= \frac{1}{\sqrt{3}}S$

[illegible] $S = \frac{4}{3}\pi R^3$ [illegible]

[illegible]

[illegible] $\frac{1}{\sqrt{3}}$ [illegible]

06. (a) $I = \int_1^2 \frac{x^3}{\sqrt{x^2 - 1}}dx \qquad u = \sqrt{x^2 - 1}$

[illegible]

විට $U^2 = x^2 - 1$

විට $\cancel{2}u\,du = \cancel{2}x\,dx$

[illegible]

$I = \int_0^{\sqrt{3}} \frac{(u^2 + 1)}{u}u\,du$

$= \int_0^{\sqrt{3}} (u^2 + 1)\,du$

$= \left(\frac{u^3}{3} + u\right)_0^{\sqrt{3}}$

$= \left(\frac{3\sqrt{3}}{3} + \sqrt{3} - 0\right)$

$= 2\sqrt{3}$ //

(b) $\int_0^1 x\tan^{-1}x\,dx$

$= \int_0^1 \tan^{-1}x\,\frac{d}{dx}\left(\frac{x^2}{2}\right)dx$

$= \left[\tan^{-1}x \cdot \frac{x^2}{2}\right]_0^1 - \frac{1}{2}\int_0^1 x^2 \cdot \frac{1}{1+x^2}dx$

$= \left[\frac{\pi}{4} \cdot \frac{1}{2} - 0\right] -$

$\frac{1}{2}\int_0^1\left[\frac{1 + x^2}{1 + x^2} - \frac{1}{1 + x^2}\right]dx$

$= \frac{\pi}{8} - \frac{1}{2}\left[x\right]_0^1 + \frac{1}{2}\left[\tan^{-1}x\right]_0^1$

$= \frac{\pi}{8} - \frac{1}{2} + \frac{\pi}{8}$

$= \frac{\pi}{4} - \frac{1}{2}$ //

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(c) $\frac{5x-4}{(2+x)(1-x+x^2)} = \frac{A}{2+x} + \frac{Bx+C}{1-x+x^2}$

$\Rightarrow A = -2,\ B = 2,\ C = -1$

$\therefore \int_1^2 \frac{5x-4}{(1-x+x^2)(2+x)}dx$

$= \int_1^2 \frac{2x-1}{1-x+x^2}dx - 2\int_1^2 \frac{dx}{x+2}$

$= [\ln|1-x+x^2|]_1^2 - 2[\ln|x+2|]_1^2$

$= (\ln 3 - \ln 1) - 2(\ln 4 - \ln 3)$

$= 3\ln 3 - 2\ln 4$

$= \ln\frac{27}{16}$

02. $u_1 = 0$ [illegible] $u_2 = 0$ [illegible] $P(x_0, y_0)$ [illegible]

[illegible]

$a_1x_0 + b_1y_0 + c_1 = 0$ — ① [illegible]

$a_2x_0 + b_2y_0 + c_2 = 0$ — ②

[illegible] $u_1 + \lambda u_2 = a_1x + b_1y + c_1 + \lambda(a_2x + b_2y + c_2) = 0$ [illegible]

$\Rightarrow (a_1+\lambda a_2)x + (b_1+\lambda b_2)y + (c_1+\lambda c_2) = 0$

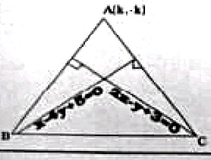
λ [illegible]

[illegible] ① [illegible] ② [illegible] λ [illegible]

$(a_1x_0+b_1y_0+c_1)+\lambda(a_2x_0+b_2y_0+c_2) = 0$

$\therefore$ [illegible] (x_0, y_0) [illegible]

$\therefore u_1 + \lambda u_2 = 0$ [illegible] λ [illegible] $u_1 = 0$ [illegible] $u_2 = 0$ [illegible]



AB, $2x - y + 3 = 0$ [illegible]

AB, $x + 2y + p = 0$ [illegible]

[illegible] A(k, -k) [illegible]

$k - 2k + p = 0 \Rightarrow p = k$

$\therefore$ AB [illegible] $x + 2y + k = 0$ [illegible]

AC, $x - 4y + 5 = 0$ [illegible]

AC [illegible] $4x + y + q = 0$ [illegible]

A (k, -k) [illegible]

$4k - k + q = 0 \Rightarrow q = -3k$

$\therefore$ AC [illegible] $4x + y - 3k = 0$

$2x - y + 3 = 0$ [illegible] $4x + y - 3k = 0$ C [illegible]

$C \equiv \left[\frac{k-1}{2}, k+2\right]$

$x - 4y + 5 = 0$ [illegible] $x + 2y + k = 0$ B [illegible]

$B \equiv \left[-\left(\frac{2k+5}{3}\right), \frac{5-k}{6}\right]$

[illegible] $G \equiv (\bar{x}, \bar{y})$ [illegible]

[illegible]

$\bar{x} = \frac{1}{3}\left[k - \left(\frac{2k+5}{3}\right) + \left(\frac{k-1}{2}\right)\right]$

$= \frac{6k - 4k - 10 + 3k - 3}{18}$

$= \frac{5k - 13}{18}$

$\bar{y} = \frac{1}{3}\left[-k + \left(\frac{5-k}{6}\right) + (k+2)\right]$

$= \frac{-6k + 5 - k + 6k + 12}{18}$

$= \frac{17 - k}{18}$

$\bar{x} + 5\bar{y} = \frac{5k-13}{18} + \frac{5(17-k)}{18}$

$= \frac{1}{18}(5k - 13 + 85 - 5k)$

$= \frac{72}{18} = 4$

$\therefore$ G, $x + 5y - 4 = 0$ [illegible]

04. [illegible] C_1 [illegible] C_2 [illegible] $C_1C_2 = |r_1 \pm r_2|$ [illegible]

[illegible] r_1 [illegible] r_2 [illegible]

[illegible]

$\sqrt{(g_1-g_2)^2 + (f_1-f_2)^2}$

$= \left|\sqrt{g_1^2+f_1^2-c_1} \pm \sqrt{g_2^2+f_2^2-c_2}\right|$

[illegible] (x_0, y_0) [illegible]

[illegible] C_1C_2 [illegible]

C_1C_2 [illegible]

$y - (-f_1) = \frac{(-f_1)-(-f_2)}{(-g_1)-(-g_2)}(x - (-g_1))$

$y + f_1 = \frac{(f_2 - f_1)}{(g_2 - g_1)}(x + g_1)$

[illegible]

$(g_2 - g_1)y + f_1g_2 - f_1g_1 = (f_2 - f_1)x + g_1f_2 - g_1f_1$

[illegible]

$(f_1-f_2)x - (g_1-g_2)y + f_1g_2 - f_2g_1 = 0$

[illegible]

$x_0^2 + y_0^2 + 2g_1x_0 + 2f_1y_0 + c_1 = 0$

[illegible]

$x_0^2 + y_0^2 + 2g_2x_0 + 2f_2y_0 + c_2 = 0$

$\Rightarrow 2(g_1-g_2)x_0 + 2(f_1-f_2)y_0 + c_1 - c_2 = 0$

[illegible] (x_0, y_0)

$2(g_1-g_2)x + 2(f_1-f_2)y_0 + c_1 - c_2 = 0$

[illegible]

[illegible]

$2(g_1-g_2)x + 2(f_1-f_2)y + c_1 - c_2 = 0$ [illegible]

[illegible]

[illegible]

$x^2 + y^2 - 2x + 4y = 0$ [illegible]

$x^2 + y^2 - 10x + 20 = 0$ [illegible]

$C_1C_2 = \sqrt{(-1+5)^2 + (2-0)^2}$

$= \sqrt{20} = 2\sqrt{5}$

$r_1 = \sqrt{(-1)^2 + 2^2 - 0} = \sqrt{5}$

$r_2 = \sqrt{(-5)^2 - 20} = \sqrt{5}$

$r_1 + r_2 = 2\sqrt{5}$

$\therefore C_1C_2 = r_1 + r_2$

$\therefore$ [illegible]

[illegible] C_1C_2 [illegible]

$\therefore$ [illegible] $A \equiv \left[\frac{1+5}{2}, \frac{(-2)+0}{2}\right]$

$= (3, -1)$

P (x, y) [illegible]

[illegible] P [illegible]

$\sqrt{x^2 + y^2 - 2x + 4y}$ [illegible]

[illegible] $\sqrt{x^2 + y^2 - 10x + 20}$ [illegible]

$\sqrt{x^2 + y^2 - 2x + 4y} = k\sqrt{x^2 + y^2 - 10x + 20}$

$\Leftrightarrow x^2 + y^2 - 2x + 4y = k^2(x^2 + y^2 - 10x + 20)$

$\Leftrightarrow (k^2-1)x^2 + (k^2-1)y^2 - (10k^2-2)x - 4y + 20k^2 = 0$

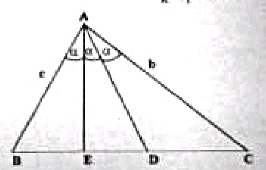
$(x^2+y^2)(k^2-1) - (10k^2-2)x - 4y + 20k^2 = 0$

$k^2 - 1 \neq 0$ [illegible] P [illegible] A [illegible]

[illegible]

$x^2 + y^2 - \frac{(10k^2-2)}{k^2-1}x - \frac{4}{k^2-1}y + \frac{20k^2}{k^2-1} = 0$

05



$BD = DC = \frac{a}{2}$

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ABD Δ සඳහා සයින් සූත්‍රය යෙදීමෙන්

$$\frac{BD}{\sin 2\alpha} = \frac{AB}{\sin A\hat{D}B}$$

$$\Rightarrow \sin A\hat{D}B = \frac{AB}{BD}\sin 2\alpha$$

ADC Δ සඳහා සයින් සූත්‍රය යෙදීමෙන්

$$\frac{AC}{\sin A\hat{D}C} = \frac{DC}{\sin \alpha}$$

$$\Rightarrow \sin A\hat{D}C = \frac{AC}{DC}\sin \alpha$$

$$\sin A\hat{D}B = \sin A\hat{D}C$$

$$\Rightarrow \frac{AC}{DC}\sin\alpha = \frac{AB}{DC}\sin 2\alpha$$

$$\Rightarrow AC \sin\alpha = AB\, 2\sin\alpha\cos\alpha$$

($\because$ DC = BD නිසා)

$$\Rightarrow \cos\alpha = \frac{AC}{2AB} = \frac{b}{2c}$$

$$\Rightarrow \cos\frac{A}{3} = \frac{b}{2c}$$

$$DE : EB = 1 : k \Rightarrow DE = \frac{1}{1+k}BD \text{ සහ}$$

$$EB = \frac{k}{1+k}BD$$

$$\Rightarrow DE = \frac{a}{2(1+k)} \text{ සහ } EB = \frac{ak}{2(1+k)}$$

තවද

$$EC = DE + DC = \frac{a(2+k)}{2(1+k)}$$

AEC Δ ට සයින් සූත්‍රය යෙදීමෙන්

$$\frac{EC}{\sin 2\alpha} = \frac{AC}{\sin A\hat{E}C}$$

$$\Rightarrow \sin A\hat{E}C = \frac{AC}{EC}\sin 2\alpha$$

එලෙසම AEB Δ හි

$$\frac{BE}{\sin\alpha} = \frac{AB}{\sin A\hat{E}B}$$

$$\Rightarrow \sin A\hat{E}B = \frac{AB}{BE}\sin\alpha$$

$$\sin A\hat{E}C = \sin A\hat{E}B$$

$$\Rightarrow \frac{AC}{EC}\sin 2\alpha = \frac{AB}{BE}\sin\alpha$$

$$\Rightarrow \cos\alpha = \frac{1}{2}\,\frac{AB \cdot EC}{BE \cdot AC}$$

$$= \frac{1}{2}\,\frac{2c(1+k)}{ak}\,\frac{a(2+k)}{2b(1+k)}$$

$$= \frac{(2+k)c}{2bk}$$

$$k = 1 \text{ නම් } \cos\alpha = \frac{3c}{2b} = \frac{b}{2c} \Rightarrow b^2 = 3c^2$$

$$\Rightarrow \left(\frac{b}{2c}\right)^2 = \frac{3}{4}$$

$$\Rightarrow \cos\alpha = \frac{b}{2c} = \frac{\sqrt{3}}{2} \Rightarrow \alpha = 30^\circ$$

$$\therefore A = 3\alpha = 90^\circ$$

$$k = 2 \text{ නම් } \cos\alpha = \frac{4c}{4b} = \frac{b}{2c} \Rightarrow b^2 = 2c^2$$

$$\Rightarrow \left(\frac{b}{2c}\right)^2 = \frac{1}{2}$$

$$\Rightarrow \cos\alpha = \frac{b}{2c} = \frac{1}{\sqrt{2}} \Rightarrow \alpha = 45^\circ$$

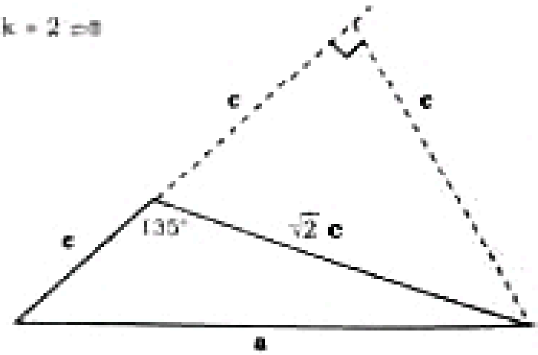
$$\therefore A = 135^\circ$$

k = 1 නම්

$$a^2 = b^2 + c^2 = 3c^2 + c^2 = 4c^2 \Rightarrow c = \frac{a}{2},$$

$$b = \frac{\sqrt{3}}{2}a$$

k = 2 නම්



$$a^2 = (AC)^2 + (AB)^2 + 2(AB)(AC)\cos 45^\circ$$

$$= 2c^2 + c^2 + 2\sqrt{2}c^2\frac{1}{\sqrt{2}}$$

$$= 5c^2$$

$$\Rightarrow c^2 = \frac{a^2}{5}$$

$$\therefore c = \frac{a}{\sqrt{5}},\ b = \sqrt{\frac{2}{5}}\,a$$

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