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3.

$$B = \frac{\cancel{\frac{\log 23}{\log 41}}\,\cancel{\frac{\log 96}{\log 24}}\,\cancel{\frac{\log 41}{\log 23}}\,\cancel{\frac{\log 47}{\log 96}}}{\cancel{\frac{\log 47}{\log 11}}\,\cancel{\frac{\log 11}{\log 24}}} = 1$$

$$A = \left|\log_2|\cos 24^\circ| + \log_2|\cos 48^\circ| + \log_2|\cos 96^\circ| + \log_2|\cos 192^\circ|\right|$$

$$\left|\underbrace{\log_2\left|\frac{\sin 384^\circ}{16\sin 24}\right|}_{-4}\right| = 4.$$

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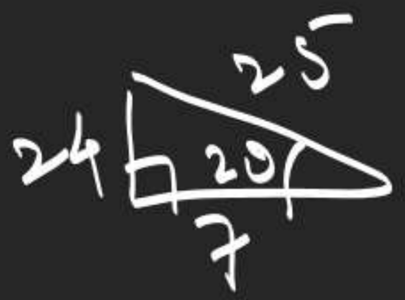
$$\tan\theta = \frac{1-\cos 2\theta}{\sin 2\theta} = \frac{1-\left(\frac{-7}{25}\right)}{-\frac{24}{25}}$$



$$\frac{4\left(\cancel{\sin\frac{\pi}{7}} + \sin\frac{3\pi}{7} - \cancel{\sin\frac{\pi}{7}}\right)}{\sin\frac{4\pi}{7}}$$

$$= 4$$

$$2\theta \in \left(\pi, \frac{3\pi}{2}\right)$$

$$\boxed{\theta \in \left(\frac{\pi}{2}, \frac{3\pi}{4}\right)}$$

$$\frac{\pi}{2}$$

$$\frac{2\cos 2\alpha + 1}{\cos\alpha \cos 2\alpha}$$

$$= \frac{1 + 2\cos\frac{2\pi}{7}}{\cos\frac{\pi}{7}\cos\frac{2\pi}{7}}$$

$$= \frac{4\sin\frac{\pi}{7} + 8\sin\frac{\pi}{7}\cos\frac{\pi}{7}\cos\frac{2\pi}{7}}{\sin\frac{4\pi}{7}}$$

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$$\sqrt{\sin^4 + 4 - 4\sin^2} = 2 - \sin^2$$

$$\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)} = \frac{-\cos(\gamma+\delta)}{\cos(\gamma-\delta)} \Rightarrow \frac{\cos(\alpha-\beta)-\cos(\alpha+\beta)}{\cos(\alpha-\beta)+\cos(\alpha+\beta)} = \frac{-\cos(\gamma+\delta)-\cos(\gamma-\delta)}{-\cos(\gamma+\delta)+\cos(\gamma-\delta)}$$

$$\sqrt{x^2} = |x|$$

$$\operatorname{antilog}_{27}\left(\frac{2}{3}\right) = (27)^{2/3}$$

$$x = 0.6666\ldots$$

$$10x = 6.666\ldots$$

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$\log_{2011} 2012 + \log_{2012} 2011 > 2$

$a_b = 2010$ >0

$> (2010)^2$

$$\frac{\cos^3 9^\circ - (4\cos^3 9^\circ - 3\cos 9^\circ)}{\cos 9^\circ}$$

$+$

$$\boxed{x \in [3^1, 3^2] \cup [3^3, \infty)}$$

$$\frac{\tan 5 - \tan 2 - \tan 3}{\tan 2 \tan 3 \tan 5}$$

$3\sin^2 9^\circ$

$$\boxed{x^3 = 20 - 3 \times 2x}$$

$$\frac{3\cancel{\cos 9} - 3\cos^3 9}{\cancel{\cos 9}}$$

$> \sqrt{\infty}$

$\log_3^3 x - 6\log_3^2 x + 11\log_3 x - 6 \geq 0$

$(t-1)(t^2 - 5t + 6) \geq 0$

$(t-1)(t-2)(t-3) \geq 0$

$-$ $+$ $-$ $+$

1 2 3

$\log_3 x \in [1, 2] \cup [3, \infty)$

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Note $\rightarrow$ $f(x) = ax^2 + bx + c$, $a, b, c \in R$

$a \neq 0$

>0 or $=0$

① $f(x) > 0 \quad \forall x \in R$

$\Rightarrow a > 0, D < 0$

② $f(x) < 0 \quad \forall x \in R$

$\Rightarrow a < 0, D < 0$

③ $f(x) \geq 0 \quad \forall x \in R$

$\Rightarrow a > 0 \;\&\; D \leq 0$

④ $f(x) \leq 0 \quad \forall x \in R$

$\Rightarrow a < 0 \;\&\; D \leq 0$

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Roots

$$ax^2+bx+c=0 \quad \begin{cases} \alpha \\ \beta \end{cases}$$

$a \neq 0,\ a, b, c \in R$

const

$$\alpha+\beta = -\frac{b}{a}$$

$$\alpha\beta = \frac{c}{a}$$

$$\alpha, \beta = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

$$\frac{3 \pm \sqrt{9+40}}{4}$$

$$\frac{3 \pm 7}{6}$$

Coeff of x $\quad \boxed{b = -a(\alpha+\beta)}$

$$ax^2+bx+c = a\left(x^2-(\alpha+\beta)x+\alpha\beta\right)$$

$$c = a\alpha\beta$$

Identity

$$\boxed{ax^2+bx+c = a(x-\alpha)(x-\beta)}$$

$$(a+b)^2 = a^2+2ab+b^2$$

$$x^2-3x+2 = (x-1)(x-2)$$

$$\boxed{2x^2-3x-5 = 2\left(x-\frac{5}{2}\right)(x+1)}$$

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Form a quad. having roots α, β

$$\boxed{(x-\alpha)(x-\beta) = 0}$$

$$x^2-(\alpha+\beta)x+\alpha\beta=0$$

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Form a cubic having roots α, β, γ.

$$\boxed{\begin{aligned}\alpha+\beta+\gamma &= -\frac{b}{a}\\ \alpha\beta+\beta\gamma+\gamma\alpha &= \frac{c}{a}\\ \alpha\beta\gamma &= -\frac{d}{a}\end{aligned}}$$

Identity

$$(x-\alpha)(x-\beta)(x-\gamma) = 0$$

coefficient.

$$x^3-(\alpha+\beta+\gamma)x^2+(\alpha\beta+\beta\gamma+\gamma\alpha)x-\alpha\beta\gamma = 0$$

$$ax^3+bx^2+cx+d = 0 \quad \alpha, \beta, \gamma \qquad a$$

$$ax^3+bx^2+cx+d = a(x-\alpha)(x-\beta)(x-\gamma)$$

$$= a\left(x^3-(\alpha+\beta+\gamma)x^2+(\alpha\beta+\beta\gamma+\gamma\alpha)x-\alpha\beta\gamma\right)$$

coeff. of x^2

$$b = -a(\alpha+\beta+\gamma)$$

coeff. of x, $c = a(\alpha\beta+\beta\gamma+\gamma\alpha)$

const. $d = -a\alpha\beta\gamma$.

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$$a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \cdots + a_2 x^2 + a_1 x + a_0 = 0 \quad \begin{matrix} \alpha_1 \\ \alpha_2 \\ \alpha_3 \\ \vdots \\ \alpha_n \end{matrix}$$

$$a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \cdots + a_1 x + a_0 = a_n(x-\alpha_1)(x-\alpha_2)(x-\alpha_3)\cdots(x-\alpha_n)$$

Coeff. of x^{n-1}, $\quad a_{n-1} = a_n(-\alpha_1 - \alpha_2 - \cdots - \alpha_n) \Rightarrow \sum \alpha_1 = -\dfrac{a_{n-1}}{a_n}$

Coeff of x^{n-2}, $\quad a_{n-2} = a_n(\alpha_1\alpha_2 + \alpha_1\alpha_3 + \alpha_1\alpha_4 + \cdots \alpha_1\alpha_n + \alpha_2\alpha_3 + \cdots \alpha_2\alpha_n + \cdots \alpha_{n-1}\alpha_n)$

$$\Rightarrow \sum \alpha_1\alpha_2 = \frac{a_{n-2}}{a_n}.$$

Coeff. of x^{n-3}, $\quad a_{n-3} = -a_n(\alpha_1\alpha_2\alpha_3 + \alpha_1\alpha_2\alpha_4 + \cdots + \alpha_{n-2}\alpha_{n-1}\alpha_n)$

$$\sum \alpha_1\alpha_2\alpha_3 = -\frac{a_{n-3}}{a_n}. \qquad \sum \alpha_1\alpha_2\alpha_3\alpha_4 = \frac{a_{n-4}}{a_n}.$$

$\vdots$

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$$a_n x^n + a_{n-1}x^{n-1} + a_{n-2}x^{n-2} + \cdots + a_1 x + a_0 = 0 \quad \alpha_1, \alpha_2, \ldots, \alpha_n$$

Vieta's Theorem

$$\sum \alpha_1 = -\frac{a_{n-1}}{a_n} = -\frac{\text{Coeff. of } x^{n-1}}{\text{Coeff of } x^n}$$

$$\sum \alpha_1\alpha_2 = \frac{a_{n-2}}{a_n} = \frac{\text{coeff of } x^{n-2}}{\text{coeff. of } x^n}$$

$$\sum \alpha_1\alpha_2\alpha_3 = -\frac{a_{n-3}}{a_n} = -\frac{\text{Coeff of } x^{n-3}}{\text{coeff. of } x^n}$$

$$\sum \alpha_1\alpha_2\alpha_3\alpha_4 = \frac{a_{n-4}}{a_n} = \frac{\text{Coeff of } x^{n-4}}{\text{coeff. of } x^n}$$

$\vdots$

$$\alpha_1\alpha_2\alpha_3 \cdots \alpha_n = (-1)^n \frac{a_0}{a_n}$$