

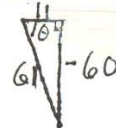
① $9680^\circ + n(360^\circ)$
 $n=26 \Rightarrow \underline{320^\circ}$
 $\therefore \boxed{D}$

Trigonometry (pg. 1)
 2004 FAMAT Convention

⑨ $\sin(3\theta) = \sin(\theta+2\theta)$
 $= \sin\theta \cos 2\theta + \sin 2\theta \cos\theta$
 $= \sin\theta(\cos^2\theta - \sin^2\theta) + 2\sin\theta \cos^2\theta$
 $= \sin\theta(1 - 2\sin^2\theta) + 2\sin\theta(1 - \cos^2\theta)$
 $= 3\sin\theta - 4\sin^3\theta$
 $\Rightarrow A+B = 3-4 = \underline{-1}$

② $MM^T = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$
 $= \begin{bmatrix} \cos^2\theta + \sin^2\theta & -\cos\theta\sin\theta + \cos\theta\sin\theta \\ -\cos\theta\sin\theta + \cos\theta\sin\theta & \cos^2\theta + \sin^2\theta \end{bmatrix}$
 $= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \therefore \boxed{B}$

⑩ $\cos\theta = \frac{11}{61} \Rightarrow \theta \approx -79.61^\circ$
 $\therefore \boxed{B} \Rightarrow \sin\theta = \underline{\underline{-\frac{60}{61}}}$



③ $\tan\psi = \frac{\sqrt{3}}{3}$
 $\tan\lambda = 1 \Rightarrow \psi = \frac{\pi}{6}, \lambda = \frac{5\pi}{4}$
 $\psi + \lambda = \underline{\underline{\frac{17\pi}{12}}} \therefore \boxed{C}$

⑪ $[-2(\cos 216^\circ + i \sin 216^\circ)]^5$
 $= (-2)^5 [\cos 1080^\circ + i \sin 1080^\circ]$
 $= -32(1 + i \cdot 0) = \underline{\underline{-32}}$

④ $f(x) = \sin(x + 2004 \cdot \frac{\pi}{2})$
 $= \sin(x + 1002\pi)$
 $= \underline{\underline{\sin(x)}} \therefore \boxed{D}$

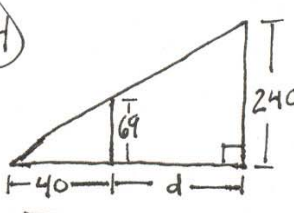
⑫ $\csc 2\theta = \frac{1}{2\sin\theta\cos\theta}$
 $\therefore \boxed{B} = \frac{f^2 + e^2}{2fe} = \frac{c^2}{2ab} = \frac{h^2}{2fd} = \frac{i^2}{2ge}$

⑤ $y_3(x) = 10\sin(x) + 8\cos(x)$
 amplitude $= \sqrt{10^2 + 8^2} \approx \underline{\underline{12.8}} \therefore \boxed{A}$

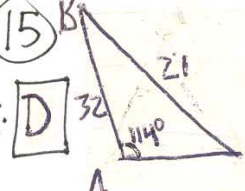
⑬ $Ax^2 + Bxy + Cy^2 + Dx + Ey + F = 0$
 $\tan 2\theta = \frac{B}{A-C} = \frac{2}{2} = 1 \Rightarrow \theta = \underline{\underline{22.5^\circ}}$
 \boxed{D} $\begin{cases} A=1, B=2 \\ C=-1, D=8 \\ E=1, F=0 \end{cases}$

⑥ $k = \frac{\sin(52^\circ)}{\sin(31.3^\circ)} \approx \underline{\underline{1.5}} \therefore \boxed{B}$

⑦ $f(t) = \frac{(\cos^2 t + \sin^2 t) - (\cos^2 t - \sin^2 t)}{2}$
 $= \underline{\underline{\sin^2(t)}} \therefore \boxed{E}$

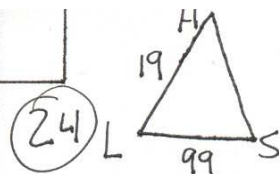
⑭ 
 $\frac{69}{40} = \frac{240}{40+d}$
 $\Rightarrow d \approx \underline{\underline{99 \text{ inches}}}$
 $\therefore \boxed{A}$

⑧ $\sin\theta = \frac{m}{4}$ find (m, θ)
 solutions: $\begin{cases} (0, 0); (0, 180^\circ); (1, 166^\circ); \\ (1, 14^\circ); (2, 30^\circ); (2, 150^\circ); \\ (3, 49^\circ); (3, 131^\circ); (4, 90^\circ). \end{cases}$
 $\Rightarrow \underline{\underline{9 \text{ solutions}}} \therefore \boxed{C}$

⑮ 
 $\angle A = 114^\circ, a = 21$
 neither b nor c can be greater than a. $\Rightarrow \underline{\underline{0 \text{ solutions}}}$
 $\therefore \boxed{D}$

16) period = $\frac{2\pi}{6} = \frac{\pi}{3}$
 frequency = $\frac{1}{\text{period}} = \frac{3}{\pi}$

Trigonometry (pg. 2)
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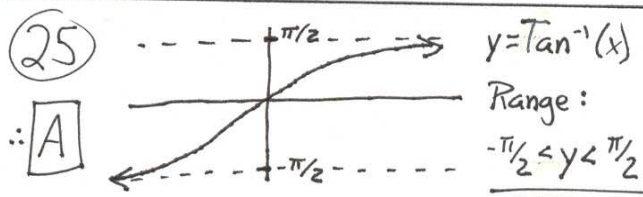


∴ [A]

∴ [C] area $\Delta LHS = \frac{1}{2}(19)(99)\sin(\angle L)$
 $= \underline{\underline{470.25}}$

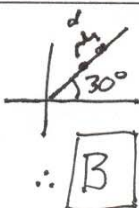
17) $1 + \cos 60^\circ + \cos^2 60^\circ + \cos^3 60^\circ + \dots$
 $= 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \dots$
 $= \frac{1}{1 - \frac{1}{2}} = \underline{\underline{2}}$

∴ [C]



∴ [A]

18) $(8, 30^\circ) \Rightarrow (4\sqrt{3}, 4)$
 $(-6, -150^\circ) \Rightarrow (3\sqrt{3}, 3)$
 $d = \underline{\underline{2}}$



∴ [B]

26) $1 + \cot^2\left(\frac{45^\circ}{2}\right) = \csc^2\left(\frac{45^\circ}{2}\right)$
 $= \left[\sin^2\left(\frac{45^\circ}{2}\right)\right]^{-1} = \left[\frac{1 - \cos 45^\circ}{2}\right]^{-1}$
 $= \frac{2}{1 - \frac{\sqrt{2}}{2}} = \frac{4}{2 - \sqrt{2}} \cdot \frac{2 + \sqrt{2}}{2 + \sqrt{2}} = \underline{\underline{4 + 2\sqrt{2}}}$

∴ [E]

19) $r = \sin \theta$
 $r^2 = r \sin \theta$
 $x^2 + y^2 = y$
 $x^2 + y^2 - y = 0$

∴ [C]

27) $\left(\frac{\sin 30^\circ}{\sin 60^\circ}\right) \left(\frac{\cot 45^\circ}{\cot 225^\circ}\right) \left(\frac{\sec 60^\circ}{\sec 360^\circ}\right) \left(\frac{\csc 30^\circ}{\csc 150^\circ}\right) \left(\frac{\cos 120^\circ}{\cos 240^\circ}\right) \tan 6^\circ$
 $= \frac{\sin 30^\circ}{\sin 60^\circ} \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 = \frac{1/2}{\sqrt{3}/2} = \underline{\underline{\frac{\sqrt{3}}{3}}}$

∴ [E]

20) $\left. \begin{aligned} a^2 + 4b^2 &= 62^2 \\ a^2 + 9b^2 &= 63^2 \end{aligned} \right\} \begin{aligned} 5b^2 &= 63^2 - 62^2 \\ b &= 5 \end{aligned}$ ∴ [E]

28) $\cos \theta = \frac{\vec{u} \cdot \vec{v}}{\|\vec{u}\| \|\vec{v}\|} = \frac{-6678}{\sqrt{6517} \cdot \sqrt{7066}} \approx -0.9841$
 $\Rightarrow \theta \approx \underline{\underline{170^\circ}}$

∴ [C]

21) $30^\circ 21' 18''$
 $= 30 + \frac{21}{60} + \frac{18}{3600}$ ∴ [E]
 $= 30.355^\circ \left(\frac{\pi \text{ rad}}{180^\circ}\right) \approx \underline{\underline{0.5298 \text{ rad}}}$

29) $\frac{\sin \theta}{25} = \frac{\sin \alpha}{6} = \frac{\sin \beta}{20}$
 $\Rightarrow \sin \alpha + \sin \beta = \frac{6}{25} \sin \theta + \frac{20}{25} \sin \theta$
 $= \frac{26}{25} \sin \theta$

∴ [A]

22) Since E & O are arbitrary, let
 $E = f(x) = x^2$, $O = g(x) = x^3$
 $H(x) = E/O = x^2/x^3 = 1/x$ ∴ [B]
 $H(x) = -H(-x) \Rightarrow E/O$ is odd

23) $\cos(\alpha + \beta) = \cos \alpha \sin \beta - \cos \beta \sin \alpha$
 $= x\sqrt{1 - 4x^2} - 2x\sqrt{1 - x^2}$ ∴ [D]

30) $c^2 = a^2 + b^2 - 2ab \cos \theta$
 $= 4 + (1 + \sqrt{3})^2 - 2(2)(1 + \sqrt{3}) \cos 30^\circ$
 $= 2 \Rightarrow \underline{\underline{c = \sqrt{2}}}$

∴ [E]