1) 8,15,17 are Pythagorean triplets. $\therefore$ x=17

2)$\tan^{-1} x = \tan^{-1}\left\{\frac{8-3}{1+24}\right\}$

x=$\frac{1}{5}$

3)given equation becomes $\sin(0.25\cos^{-1} x) = \frac{\sqrt{3}}{2}$

$$0.25\cos^{-1} x = \frac{\pi}{3}$$

$$=> x = \cos\frac{4\pi}{3}$$

But $\frac{4\pi}{3} \notin [0,\pi]$

No solution

4) $\sin 2\theta = \frac{2\tan\theta}{1+\tan^2\theta} = \frac{2\left(\frac{1}{3}\right)}{1+\frac{1}{9}} = \frac{3}{5}$

$\cos\alpha = \frac{1}{3}$,

G E = $\frac{3}{5} + \frac{1}{3} = \frac{14}{15}$

5) $\frac{\sin^{-1}\left(\sin(\frac{\pi}{2}-x)\right)+\cos^{-1}\left(\cos\left(\frac{\pi}{2}-x\right)\right)}{\tan^{-1}\left(\tan\left(\frac{\pi}{2}-x\right)\right)+\cot^{-1}\left(\cot\frac{\pi}{2}-x\right)} = \frac{\pi-2x}{\pi-2x} = 1$

6) $Use\ sin\ 2\theta = 2sin\ \theta cos\theta$

And simplify to get

7) G E = $\sin\left(\sin^{-1}\frac{2}{3} + \cos^{-1}\frac{2}{3} + \cos^{-1}\frac{2}{3}\right)$

= $\sin\left(90 + \cos^{-1}\frac{2}{3}\right) = \frac{2}{3}$

8) Maximum value of $\cos^{-1} x$ is π

=> $cos\ \pi = -1$

$Similarly\ for\ others\ .hence\ xy\ +yz\ +\ zx\ =3$

9) $\pi\ -\ sin^{-1}\sqrt{1-x^2}$

10) Tan $(\frac{1}{2}\cos^{-1}\frac{5}{13})$ = tan $(\frac{\theta}{2})$ = $\sqrt{\frac{1-cos\theta}{1+cos\theta}}$ where θ = $\cos^{-1}\frac{5}{13}$

= $\sqrt{\frac{1-5/13}{1+5/13}}$ =2/3

11) put x = sin α and x = sin β ands simplify using sin (a+b) formula

Given expression = $\sin^{-1} x$ - $\sin^{-1}\sqrt{x}$

12) use $\sin^{-1} x$ + $\cos^{-1} x$ = $\pi/2$

And simplify to get $\cos^{-1} x$ =3$\frac{\pi}{10}$

13) put x = sin θ and simplify to get 2$\sin^{-1} x$

14) put p = 0 and then we get $\sqrt{1-q}$ = $\frac{1}{\sqrt{2}}$

15) put a = 1 , b = 1 and c= $\sqrt{2}$ and simplify

G E = $\frac{\pi}{4}$

16) x = 1

17) A = π - (B+C) = π - ($\tan^{-1}\frac{1}{2}$ + $\tan^{-1}\frac{1}{3}$) = π- $\frac{\pi}{4}$ = 3$\frac{\pi}{4}$

Ansd then use sine rule to simplify to get b = $\frac{2\sqrt{2}}{\sqrt{5}}$

18) use $\sin^{-1} x$ + $\cos^{-1} x$ = $\pi/2$

x = $\frac{3}{5}$

19) $x = \sin\left(\frac{1}{2}\cos^{-1}\frac{a-b}{a+b}\right) = \sin\left(\frac{\theta}{2}\right)$

$= \sqrt{\frac{1-\cos\theta}{2}} = \sqrt{\frac{1}{2}\left(1-\frac{a-b}{a+b}\right)} = \sqrt{\frac{b}{a+b}}$

20) x = 3

21) $\cot\left(\tan^{-1}\frac{3}{4}+\tan^{-1}\frac{2}{3}\right) = \cot\left(\tan^{-1}\left(\frac{\frac{3}{4}+\frac{2}{3}}{1-1/2}\right)\right)$

$\text{Cot}\left(\tan^{-1}\frac{17}{6}\right) = 6/17$

22) go from the alternatives

x = ½ satisfies the given equation.

23) $\tan^{-1}\frac{1}{2} + \tan^{-1}\frac{1}{3} = \frac{\pi}{4}$

24) clearly x = ½ satisfies

25) $\cos^{-1} x = \tan^{-1} 3/4 + \tan^{-1} 1/7 = \tan^{-1} 1 = \frac{\pi}{4}$

$\Rightarrow x = \cos\frac{\pi}{4} = \frac{1}{\sqrt{2}}$

Answer key

1) b	6) b	11) c	16) a	21) c
2) c	7) c	12) d	17) c	22) b
3) a	8) d	13) a	18) a	23) d
4) c	9) c	14) a	19) b	24) a
5) b	10) b	15) b	20) a	25) c