14.) $\sin^2 10^\circ + \sin^2 20^\circ + \cdots + \sin^2 90^\circ$

$= \sin^2(10^\circ) + (1-\cos^2(80)) + \sin^2(20^\circ) + (1-\cos^2(70^\circ)) + \cdots + 1$

$= \cancel{\sin^2(10^\circ)} + (1-\sin^2(\cancel{90-80})) + \sin^2(20^\circ) + (1-\sin^2(20)) + \cdots + 1$

$= 1 + 1 + 1 + 1 + 1 = \boxed{5}$

15.) $\csc(\operatorname{Arcsin}\frac{1}{2} - \operatorname{Arccos}\frac{1}{2})$

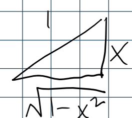
$= \csc(\frac{\pi}{6} - \frac{\pi}{3})$

$= \csc(-\frac{\pi}{6}) = \boxed{-2}$

16.) $\operatorname{Arcsin} x = y$

$\tan y = \tan \operatorname{Arcsin} x$

$= \boxed{\dfrac{x}{\sqrt{1-x^2}}}$



17.) $\sin nq = c$

$nq = \operatorname{Arcsin} c + 2\pi k, \quad \pi - \operatorname{Arcsin} c + 2\pi k$

$q = \dfrac{\operatorname{Arcsin} c}{n} + \dfrac{2\pi k}{n}, \quad -\dfrac{\operatorname{Arcsin} c}{n} + \dfrac{\pi + 2\pi k}{n}, \quad 0 \le q < 2\pi$

$-\frac{\pi}{2} < \operatorname{Arcsin} c < \frac{\pi}{2}$

$0 \le \dfrac{\operatorname{Arcsin} c}{n} + \dfrac{2\pi k}{n} < 2\pi$

$0 \le \dfrac{\operatorname{Arcsin} c}{2\pi} + k < n$

$-\dfrac{\operatorname{Arcsin} c}{2\pi} \le k < n - \dfrac{\operatorname{Arcsin} c}{2\pi}$

n solutions

$\dfrac{\operatorname{Arcsin} c}{2\pi} \le \frac{1}{2} + k < n + \dfrac{\operatorname{Arcsin} c}{2\pi}$

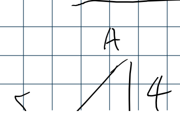
$\dfrac{\operatorname{Arcsin} c}{2\pi} - \frac{1}{2} \le k < n + \dfrac{\operatorname{Arcsin} c}{2\pi} - \frac{1}{2}$

n solutions

(don't collide)

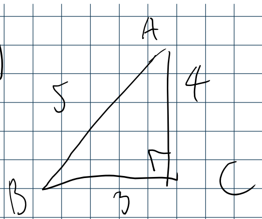
$\boxed{2n \text{ solutions for } q}$

18.)



$\dfrac{\sin A}{} = \dfrac{\sin B}{} = \dfrac{\sin C}{}$

18.)



$$\frac{\sin A}{3} = \frac{\sin B}{4} = \frac{\sin C}{5}$$

$$\sin A = \frac{3}{5}$$
$$\sin B = \frac{4}{5}$$
$$\sin C = 1$$

$$\sin A + \sin 2B + \sin 3C$$
$$= \frac{3}{5} + 2\sin B \cos B + \sin \frac{3\pi}{2}$$
$$= \frac{3}{5} + 2\left(\frac{4}{5}\right)\left(\frac{3}{5}\right) - 1$$
$$= \frac{3}{5} + \frac{24}{25} - 1$$
$$= \boxed{\frac{14}{25}}$$

19.) $\text{Arctan}\,\frac{x}{2} + \text{Arctan}\,\frac{2x}{3} = \frac{\pi}{4}$

$$\text{Arctan}\,\frac{x}{2} = \frac{\pi}{4} - \text{Arctan}\,\frac{2x}{3}$$
$$\frac{x}{2} = \tan\left(\frac{\pi}{4} + \text{Arctan} - \frac{2x}{3}\right)$$

$$= \frac{\tan\left(\frac{\pi}{4}\right) + \tan \text{Arctan}\left(-\frac{2x}{3}\right)}{1 - \tan\left(\frac{\pi}{4}\right)\tan\left(\text{Arctan} - \frac{2x}{3}\right)}$$

$$= \frac{1 - \frac{2x}{3}}{1 + \frac{2x}{3}}$$

$$\frac{x}{2} + \frac{x^2}{3} = 1 - \frac{2x}{3}$$
$$3x + 2x^2 = 6 - 4x$$
$$2x^2 + 7x - 6 = 0$$

$$x = \frac{-7 \pm \sqrt{49+4(2)(6)}}{4}$$

$$= \boxed{\frac{-7+\sqrt{97}}{4}}$$

20.) $2\sin\left(4\pi x + \frac{\pi}{2}\right) + 3\cos(5\pi x)$

$= 2\left(\cancel{\sin(4\pi x)\cos\left(\frac{\pi}{2}\right)} + \sin\frac{\pi}{2}\cos(4\pi x)\right) + 3\cos 5\pi x$

$= 2\cos(4\pi x) + 3\cos(5\pi x)$

$T = m \cdot \frac{1}{2} = n \cdot \frac{2}{5}$

$m = n \cdot \frac{4}{5}$ $\qquad m, n = (4, 5)$

$T = 2$

21.) $\cos 2x = \cos^2 x - \sin^2 x = 2\cos^2 x - 1$

$\cos 4x = \cos^2 2x - \sin^2 2x$

$= (\cos^2 x - \sin^2 x)^2 - 4\sin^2 x \cos^2 x$

$= \cos^4 x - 2\cos^2 x \sin^2 x + \sin^4 x - 4\sin^2 x \cos^2 x$

$= \cos^4 x - 6\cos^2 x \sin^2 x + \sin^4 x$

$= 2\sin^4 x - 2\sin^2 x + 1 - 6\cos^2 x \sin^2 x$

$\cos^2 2x = \cos^4 x - 2\cos^2 x \sin^2 x + \sin^4 x$

$= (1-\sin^2 x)^2 -$ " "

$= 2\sin^4 x - 2\sin^2 x + 1 - 2\cos^2 x \sin^2 x$

$-\cos 4x + 3\cos^2 2x = 4\sin^4 x - 4\sin^2 x + 2$

$= 4\sin^4 x - 4 + 4\cos^2 x + 2$

$= 4\sin^4 x + 4\cos^2 x - 2$

$-2\cos 2x \qquad -(4\cos^2 x - 2)$

$3\cos^2 2x - \cos 4x - 2\cos 2x = 4\sin^4 x$

$$\sin^4 x = \boxed{\frac{\cos 2x(3\cos 2x - 2) - \cos 4x}{4}}$$

22.) $\cot 10 + \tan 5$

$= \frac{\cos 10}{\sin 10} + \frac{\sin 5}{\cos 5}$

$= \frac{\cos 10 \cos 5 + \sin 5 \sin 10}{\sin 10 \cos 5}$

$= \frac{\cos(10-5)}{\sin 10 \cancel{\cos 5}} = \boxed{\csc 10}$

23.) $\sin x = \cos 2x \quad , \quad 0 \leq x \leq \frac{\pi}{2}$

$x = \arcsin \cos 2x$

$= \text{Arcsin} \sin(2x + \frac{\pi}{2}) \ , \ \pi - \text{Arcsin} \sin(2x + \frac{\pi}{2})$

$x = 2x + \frac{\pi}{2} \ , \ \pi - 2x - \frac{\pi}{2}$

$\cancel{-x = \frac{\pi}{2}} \qquad 3x = \frac{\pi}{2}$

$\boxed{x = \frac{\pi}{6}}$

24.) i.) $\sin 10° \sin 20° \sin 30° = \sin 10° \sin 10° \sin 100°$

$\Leftrightarrow \frac{\sin 20°}{2} = \sin 10° \sin 80°$

$\Leftrightarrow \sin 10° \cos 10° = \sin 10 \cos 10°$ ✓

ii.) $\sin 20° \cancel{\sin 20°} \sin 30° = \sin 10° \cancel{\sin 20°} \sin 80°$

$\Leftrightarrow \frac{\sin 20°}{2} = \sin 10° \sin 80°$

$\Leftrightarrow \sin 10 \cos 10 = \sin 10° \cos 10°$ ✓

iii.) $\sin 20° \sin 30° \sin 30° = \sin 10° \sin 40° \sin 50°$

$\Leftrightarrow \frac{1}{2} \sin 80 = \sin 40 \sin 50$

$\Leftrightarrow \cancel{\sin 40} \cos 40 = \cancel{\sin 40} \sin 50$

$\Leftrightarrow \cos 40° = \cos 40°$ ✓

25.) $8 \sin x \cos^5 x - 8 \sin^5 x \cos x = 1$

$8(\cos^4 x - \sin^4 x) \sin x \cos x = 1$

$8 \cancel{(\cos^2 x + \sin^2 x)} (\cos^2 x - \sin^2 x) \sin x \cos x = 1$

$4 \cos 2x \sin 2x = 1$

$2 \sin 4x = 1$

$\sin 4x = \frac{1}{2}$

$4x = \frac{\pi}{6}$

$\boxed{x = \frac{\pi}{24}}$

26.) $\sin x + \cos x = -\frac{1}{5} \ , \ \frac{3}{4}\pi \leq x \leq \pi$

$\frac{1}{R}(\sin x \cos\theta + \cos x \sin\theta) = -\frac{1}{5}$

2(a) $\sin x + \cos x = -\frac{1}{5}$, $\frac{3}{4}\pi \le x \le \pi$

$\frac{1}{R}\left(\sin x \cos\theta + \cos x \sin\theta\right) = -\frac{1}{5}$

$\sin\theta = \cos\theta \Rightarrow \theta = \frac{\pi}{4}$

$\frac{1}{R}\ \frac{\sqrt{2}}{2} = 1 \Rightarrow R = \frac{\sqrt{2}}{2}$

$\sqrt{2}\left(\sin x \cos\frac{\pi}{4} + \cos x \sin\frac{\pi}{4}\right) = -\frac{1}{5}$

$\sqrt{2}\sin\left(x + \frac{\pi}{4}\right) = -\frac{1}{5}$

$\sin\left(x + \frac{\pi}{4}\right) = -\frac{\sqrt{2}}{10}$

$x + \frac{\pi}{4} = \arcsin -\frac{\sqrt{2}}{10}$

$x = \arcsin -\frac{\sqrt{2}}{10} - \frac{\pi}{4}$

$x = \frac{3\pi}{4} - \text{Arcsin} -\frac{\sqrt{2}}{10}$

$= \frac{3\pi}{4} + \text{Arcsin}\frac{\sqrt{2}}{10}$

$\cos 2x = \cos^2 x - \sin^2 x$

$= \cos^2\left(\frac{3\pi}{4} + \text{Arcsin}\frac{\sqrt{2}}{10}\right) - \sin^2\left(\frac{3\pi}{4} + \text{Arcsin}\frac{\sqrt{2}}{10}\right)$

$= \left(\cos\frac{3\pi}{4}\cos\text{Arcsin}\frac{\sqrt{2}}{10} - \sin\frac{3\pi}{4}\sin\text{Arcsin}\frac{\sqrt{2}}{10}\right)^2 - \left(\sin\frac{3\pi}{4}\cos\text{Arcsin}\frac{\sqrt{2}}{10} + \cos\frac{3\pi}{4}\sin\text{Arcsin}\frac{\sqrt{2}}{10}\right)^2$

$= \left(-\frac{\sqrt{2}}{2}\ \frac{\sqrt{98}}{10} - \frac{\sqrt{2}}{2}\ \frac{\sqrt{2}}{10}\right)^2 - \left(\frac{\sqrt{2}}{2}\ \frac{\sqrt{98}}{10} - \frac{\sqrt{2}}{2}\ \frac{\sqrt{2}}{10}\right)^2$

$= \left(-\frac{14}{20} - \frac{2}{20}\right)^2 - \left(\frac{14}{20} - \frac{2}{20}\right)^2$

$= \frac{256}{400} - \frac{144}{400}$

$= \frac{16}{25} - \frac{9}{25} = \boxed{\frac{7}{25}}$

27.) $\cos x + \sin x = \frac{1}{2}$, $0° < x < 180°$

$\sqrt{2}\sin\left(x + \frac{\pi}{4}\right) = \frac{1}{2}$

$\sin\left(x + \frac{\pi}{4}\right) = \frac{\sqrt{2}}{4}$

$x = \cancel{\text{Arcsin}\left(\frac{\sqrt{2}}{4}\right) - \frac{\pi}{4}}$, $\quad \frac{3\pi}{4} - \text{Arcsin}\left(\frac{\sqrt{2}}{4}\right)$

$\tan\left(\frac{3\pi}{4} - \text{Arcsin}\left(\frac{\sqrt{2}}{4}\right)\right)$

$= \dfrac{\tan\frac{3\pi}{4} - \tan\text{Arcsin}\left(\frac{\sqrt{2}}{4}\right)}{1 + \tan\frac{3\pi}{4}\tan\text{Arcsin}\frac{\sqrt{2}}{4}}$

$= \dfrac{-1 - \frac{1}{\sqrt{7}}}{1 - \frac{1}{\sqrt{7}}}\ \dfrac{\left(1 + \frac{1}{\sqrt{7}}\right)}{\left(1 + \frac{1}{\sqrt{7}}\right)}$

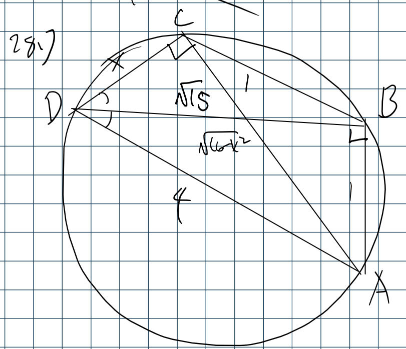
$\dfrac{-\left(1 + \frac{2}{\sqrt{7}} + \frac{1}{7}\right)}{1 - \frac{1}{7}}$

$= \dfrac{-8 - 14\frac{\sqrt{7}}{7}}{}$

C

$$= \boxed{\frac{-4-\sqrt{7}}{3}}$$

28.)



$$|ABCD| = \sqrt{15}/2 + \frac{1}{2}x\sin C = 2x\sin D + \frac{1}{2}\sin B$$

$$= \sqrt{15} + x\sin C = x\sqrt{16-x^2} + \sin B$$

$$\widehat{AB} = \widehat{CB} \Rightarrow \frac{1}{2}x\sin C = \frac{1}{2}\sqrt{15}\,(\sin D/2)\,x$$

$$= \frac{1}{2}\sqrt{15}\sqrt{\frac{1-\cos D}{2}}\,x$$

$$= \frac{1}{2}\sqrt{15}\sqrt{\frac{1-x/4}{2}}\,x$$

$$= \frac{1}{2}\sqrt{15}\sqrt{\frac{4-x}{8}}\,x$$

$$\sqrt{15} + \sqrt{15}\sqrt{\frac{4-x}{8}}\,x = x\sqrt{16-x^2} + \sin B$$

$$\angle B = 90 + \left(180 - \frac{D}{2} - C\right)$$

$$= 90 + \left(180 - \frac{D}{2} - \left(90 + D/2\right)\right)$$

$$= 90 + (90 - D)$$

$$= 180 - D$$

$$\sqrt{15} + \sqrt{15}\sqrt{\frac{4-x}{8}}\,x = x\sqrt{16-x^2} + \sin D$$

$$\sqrt{15} + \sqrt{15}\sqrt{\frac{4-x}{8}}\,x = x\sqrt{16-x^2} + \frac{\sqrt{16-x^2}}{4}$$

29.) $$\frac{\sin^2 x}{3} + \frac{\cos^2 x}{7} = \frac{-\sin 2x + 1}{10}$$

$$\frac{1}{7} + \frac{4}{21}\sin^2 x = \frac{-\sin 2x + 1}{10}$$

$$\frac{1}{7} + \frac{4}{21}\left(\frac{1-\cos 2x}{2}\right) = \frac{-\sin 2x + 1}{10}$$

$$\frac{1}{7} + \frac{2}{21} - \frac{2}{21}\cos 2x = -\frac{1}{10}\sin 2x + \frac{1}{10}$$

$$\frac{1}{7}+\frac{2}{21}-\frac{2}{21}\cos 2x=-\frac{1}{10}\sin 2x+\frac{1}{10}$$

$$\frac{1}{10}\sin 2x-\frac{2}{21}\cos 2x=-\frac{29}{210}$$

$$21\sin 2x-20\cos 2x=-29$$

$$\tan\theta=-\frac{20}{21}$$

$$\theta=\arctan -\frac{20}{21}$$

$$R=\frac{21}{\cos\arctan\frac{20}{21}}=\frac{20}{\sin\arctan\frac{20}{21}}=\frac{20}{20/\sqrt{841}}=\sqrt{841}=29$$

$$\cancel{29}\sin\left(2x-\arctan\frac{20}{21}\right)=-29$$

$$\sin\left(2x-\arctan\frac{20}{21}\right)=-1$$

$$2x=-\arcsin 1+\arctan\frac{20}{21}$$

$$\arctan\frac{20}{21}=2x+\pi/2$$

$$x=\frac{1}{2}\arctan\frac{20}{21}-\frac{\pi}{4}$$

$$\tan x=\frac{\tan\frac{1}{2}\arctan\frac{20}{21}-\tan\frac{\pi}{4}}{1+\tan\frac{1}{2}\arctan\frac{20}{21}\tan\frac{\pi}{4}}$$

$$=\frac{\tan\frac{1}{2}\arctan\frac{20}{21}-1}{1+\tan\frac{1}{2}\arctan\frac{20}{21}}$$

$$=\frac{\frac{\sin\arctan\frac{20}{21}}{1+\cos\arctan\frac{20}{21}}-1}{1+\frac{\sin\arctan\frac{20}{21}}{1+\cos\arctan\frac{20}{21}}}$$

$$=\frac{\frac{\frac{20}{29}}{1+\frac{21}{29}}-1}{1+\frac{\frac{20}{29}}{1+\frac{21}{29}}}$$

$$=\frac{20}{29+21}-1=\frac{-\frac{3}{5}}{\frac{7}{\ }}=\boxed{-\frac{3}{7}}$$

$$= \frac{\frac{20}{29+21} - 1}{1 + \frac{20}{29+21}} = \frac{-\frac{?}{5}}{\frac{7}{5}} = \boxed{-\frac{?}{7}}$$

30.) $A = 20^\circ$, $B = 25^\circ$, $(1+\tan A)(1+\tan B) = X$

$$X = \tan A \tan B + \tan A + \tan B + 1$$

$$X - \tan A - \tan B - 1 = \tan A \tan B$$

$$X - \tan A \tan B - 1 = \tan A + \tan B$$

$$\frac{X - \tan A \tan B - 1}{1 - (X - \tan A - \tan B - 1)} = \tan 45$$

$$\frac{(X-1) - \tan A \tan B}{\tan A + \tan B - X + 2} = 1$$

$$\frac{\tan A + \tan B - X + 2}{(X-1) - \tan A \tan B} = 1$$

$$X - 1 - \tan A \tan B = \tan A + \tan B - X + 2$$

$$2X = \tan A + \tan B + \tan A + \tan B + 3$$

$$-X = -2$$

$$\boxed{X = 2}$$

31.) $0 < \theta < \frac{\pi}{2}$

$$\sin \tfrac{1}{2}\theta = \sqrt{\frac{X-1}{2X}}$$

$$\sin \tfrac{1}{2}\theta = \sqrt{\frac{1-\cos\theta}{2}} = \sqrt{\frac{X-1}{2X}}$$

$$1 - \cos\theta = \frac{X-1}{X}$$

$$1 - \cos\theta = 1 - \frac{1}{X}$$

$$\cos\theta = \frac{1}{X}$$

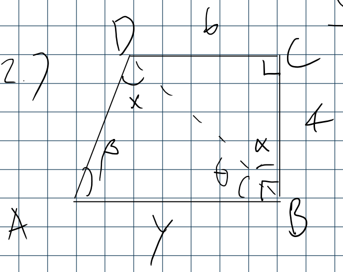
$$\tan\theta = \frac{\sin\theta}{\cos\theta} = \frac{\sqrt{1-\cos^2\theta}}{\cos\theta}$$

$$= \frac{\sqrt{1 - 1/X^2}}{1/X}$$

$$= X\sqrt{1 - 1/X^2}$$

$$= \boxed{\sqrt{x^2-1}}$$

32.)



$$DB = \sqrt{36+16}$$
$$= \sqrt{52}$$
$$= 2\sqrt{13}$$

$$\frac{1}{2} y \sin\theta \cdot 2\sqrt{13} = \frac{1}{2} 2\sqrt{13}\ \overline{AD} \sin x$$

$$\frac{\sin\alpha}{6} = \frac{\sin 90}{2\sqrt{13}} \qquad \frac{\sin\left(\frac{\pi}{2}-\theta\right)}{6} = \frac{1}{2\sqrt{13}}$$

$$\cos\theta = \frac{3}{\sqrt{13}}$$

$$\sin\theta = \sqrt{1-\frac{9}{13}}$$

$$y\sqrt{1-9/13} = \overline{AD} \sin x$$

$$y\sqrt{4/13} = \overline{AD} \sin x$$

$$\beta = \pi - x - \theta$$

$$\frac{\sin\theta}{AD} = \frac{\sin(\pi - x - \theta)}{2\sqrt{13}}$$

$$= \frac{\sin(x+\theta)}{2\sqrt{13}}$$

$$\frac{\sqrt{4/13}}{AD} = \frac{\sin x \cos\theta + \sin\theta \cos x}{2\sqrt{13}}$$

$$\frac{2}{\cancel{\sqrt{13}}\, AD} = \frac{\sin x\ 3/\sqrt{13} + 2/\sqrt{13} \cos x}{2\cancel{\sqrt{13}}}$$

$$AD = \frac{4}{\sin x \frac{3}{\sqrt{13}} + \frac{2}{\sqrt{13}}\cos x} = \frac{4\sqrt{13}}{3\sin x + 2\cos x}$$

$$y\frac{2}{\sqrt{13}} = \frac{4\sqrt{13}}{3\sin x + 2\cos x} \sin x$$

$$y = \boxed{\frac{26 \sin x}{3\sin x + 2\cos x}}$$

33.) $\cos 36^\circ - \cos 72^\circ = x$

$\cos 72^\circ = 2\cos^2 36^\circ - 1$

33.) $\cos 36^\circ - \cos 72^\circ = x$

$\cos 72^\circ = 2\cos^2 36^\circ - 1$

$\cos 36^\circ = 1 - 2\sin^2 18^\circ$

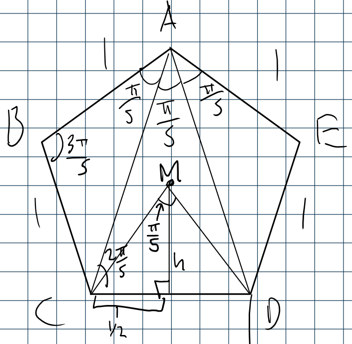
$= 1 - 2\cos^2 72^\circ$

$\cos 36 + \cos 72^\circ = 2\cos^2 36^\circ - 2\cos^2 72^\circ$

$\cancel{\cos 36 + \cos 72^\circ} = 2(\cancel{\cos 36^\circ + \cos 72})(\cos 36^\circ - \cos 72^\circ)$

$\cos 36^\circ - \cos 72^\circ = \boxed{1/2}$

34.)



$[ABCDE] = 2[ABC] + [ACD]$

$= 2\left(\frac{1}{2}\sin\frac{3\pi}{5}\cdot 1\cdot 1\right) + \frac{1}{2}\cdot 1\cdot\frac{1}{2}\tan\frac{2\pi}{5}$

$= \sin\frac{3\pi}{5} + \frac{1}{4}\tan\frac{2\pi}{5}$

$\Rightarrow 4[ABCDE] = 4\sin\frac{3\pi}{5} + \tan\frac{2\pi}{5}$

$[ABCDE] = 5[MCD]$

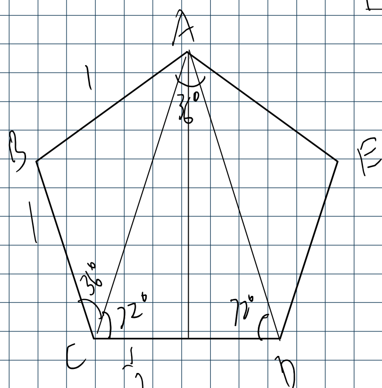
$= 5\left(\frac{1}{2}\left(\frac{1}{2}\right)\cot\frac{\pi}{5}\cdot 1\right)$

$= \frac{5}{4}\cot\frac{\pi}{5}$

$\Rightarrow 4[ABCDE] = 5\cot\frac{\pi}{5}$

$\therefore \boxed{4\sin\frac{3\pi}{5} + \tan\frac{2\pi}{5} = 5\cot\frac{\pi}{5}}$

35.)



$4\sin 72^\circ + \tan 72^\circ = 5\cot 36^\circ$

$4\cos 18^\circ + \frac{\cos 18^\circ}{\sin 18^\circ} = 5\,\frac{\cos 36^\circ}{\sin 36^\circ}$

$= 5\,\frac{\cos 36^\circ}{2\sin 18^\circ\cos 18^\circ}$

$4\cos 18^\circ\sin 18^\circ + \cos 18^\circ = 5/2\,\frac{\cos 36^\circ}{\cos 18^\circ}$

$4\cos^2 18^\circ\sin 18^\circ + \cos^2 18^\circ = \frac{5}{2}\cos 36^\circ$

$= 5(1 - 2\sin^2 18^\circ)$

$$4\cos^2 18^\circ \sin 18 + \cos^2 18 = \frac{5}{2}\cos 36^\circ$$

$$= \frac{5}{2}(1-2\sin^2 18^\circ)$$

$$4(1-\sin^2 18^\circ)\sin 18^\circ + 1 - \sin^2 18^\circ = \frac{5}{2} - 5\sin^2 18^\circ$$

$$4(1-\sin^2 18)\sin 18^\circ - \frac{3}{2} + 4\sin^2 18^\circ = 0$$

$$4\sin 18^\circ - 4\sin^3 18^\circ + 4\sin^2 18 - \frac{3}{2} = 0$$

$$8\sin^3 18^\circ - 8\sin^2 18 - 8\sin 18 + 3 = 0$$

$$(2\sin 18^\circ - 3)(4\sin^2 18^\circ + 2\sin 18^\circ - 1) = 0$$

$$\sin 18^\circ = \cancel{\frac{3}{2}},\ \frac{-2 \pm \sqrt{4+4(4)(1)}}{8}$$

$$,\ \frac{-2 \pm \sqrt{20}}{8}$$

$$,\ \frac{-2 \pm 2\sqrt{5}}{8}$$

$$,\ \frac{-1 \pm \sqrt{5}}{4}$$

$$,\ \boxed{\frac{\sqrt{5}-1}{4}}$$

$$\cos 36^\circ = 1 - 2\sin^2 18^\circ$$

$$= 1 - 2\left(\frac{\sqrt{5}-1}{4}\right)^2$$

$$= 1 - 2\left(\frac{5-2\sqrt{5}+1}{16}\right)$$

$$= 1 - \frac{6-2\sqrt{5}}{8}$$

$$= 1 - \frac{3-\sqrt{5}}{4}$$

$$= \frac{\sqrt{5}-3+4}{4} = \boxed{\frac{\sqrt{5}+1}{4}}$$