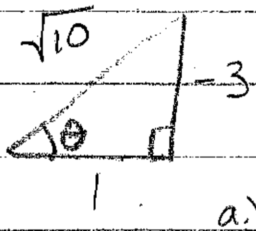
p.490 17, 35, 43, 61 → 6.5

17.) $\tan\theta = -3$, $\sin\theta < 0$

$\tan\theta = \dfrac{\sin\theta}{\cos\theta}$, if $\tan\theta$ is negative and $\sin\theta$ is neg. then $\cos\theta$ must be (+).

→ must be in Q4.



a.) $\sin(2\theta) = 2\sin\theta\cos\theta = 2 \cdot \dfrac{-3}{\sqrt{10}} \cdot \dfrac{1}{\sqrt{10}} = \dfrac{-6}{10} = \boxed{\dfrac{-3}{5}}$

b.) $\cos(2\theta) = 2\cos^2\theta - 1 = 2\left(\frac{1}{\sqrt{10}}\right)^2 - 1 = 2\left(\frac{1}{10}\right) - 1 = \boxed{\dfrac{-4}{5}}$

* Since $0 \le \theta \le 2\pi$, to find the restrictions for $\left(\frac{\theta}{2}\right)$, divide all parts by 2 → $\dfrac{0}{2} \le \left(\dfrac{\theta}{2}\right) \le \dfrac{2\pi}{2}$ → $0 \le \left(\dfrac{\theta}{2}\right) \le \pi$

∴ Tan is (−), so $\left(\frac{\theta}{2}\right)$ must be in Q2 For $0 \le \left(\frac{\theta}{2}\right) \le \pi$

c.) $\sin\left(\dfrac{\theta}{2}\right) = \sqrt{\dfrac{1-\cos\theta}{2}} = \sqrt{\dfrac{1-\left(\frac{1}{\sqrt{10}}\right)}{2}} = \sqrt{\dfrac{\frac{\sqrt{10}-1}{\sqrt{10}}}{2}} = \sqrt{\dfrac{\frac{(\sqrt{10}-1)}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}}{2}}$

* Sin is (+) in Q2

$= \sqrt{\dfrac{\frac{10-\sqrt{10}}{10}}{2}} = \sqrt{\dfrac{10-\sqrt{10}}{20}} = \dfrac{\sqrt{10-\sqrt{10}}}{2\sqrt{5}}$

$= \dfrac{1}{2}\dfrac{\sqrt{10-\sqrt{10}}}{\sqrt{5}} = \boxed{\dfrac{1}{2}\sqrt{\dfrac{10-\sqrt{10}}{5}}}$

d.) $\cos\left(\dfrac{\theta}{2}\right) = -\sqrt{\dfrac{1+\cos\theta}{2}}$

$= -\sqrt{\dfrac{1+\frac{1}{\sqrt{10}}}{2}} = -\sqrt{\dfrac{\frac{\sqrt{10}+1}{\sqrt{10}}}{2}}$

* cos is (−) in Q2

$= -\sqrt{\dfrac{\frac{\sqrt{10}+1}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}}{2}} = -\sqrt{\dfrac{\frac{10+\sqrt{10}}{10}}{2}}$

$= -\sqrt{\dfrac{10+\sqrt{10}}{20}} = \boxed{-\dfrac{1}{2}\sqrt{\dfrac{10+\sqrt{10}}{5}}}$

35.) $\cos^4\theta - \sin^4\theta = \cos(2\theta)$

$= (\cos^2\theta + \sin^2\theta)(\cos^2\theta - \sin^2\theta)$

$= (1)(\cos^2\theta - \sin^2\theta) = \cos(2\theta)$ ✓

43.) $\dfrac{\cos(2\theta)}{1+\sin(2\theta)} = \dfrac{\cot\theta - 1}{\cot\theta + 1}$ * start w/right side

$$\frac{\frac{\cos}{\sin} - 1}{\frac{\cos}{\sin} + 1} = \frac{\frac{\cos - \sin}{\sin}}{\frac{\cos + \sin}{\sin}} = \frac{\cos - \sin}{\cos + \sin} \cdot \frac{\cos + \sin}{\cos + \sin}$$

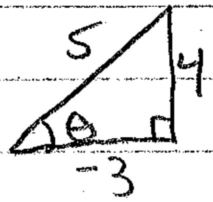
$$= \frac{\cos^2 - \sin^2}{\cos^2 + 2\sin\cos + \sin^2} = \frac{\cos(2\theta)}{1 + 2\sin\cos} = \frac{\cos(2\theta)}{1+\sin(2\theta)}$$ ✓

61.) $\tan\left[2\cos^{-1}\left(\frac{-3}{5}\right)\right]$

$\cos^{-1}\left(\frac{-3}{5}\right) = \theta$

$\cos\theta = \frac{-3}{5}$

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



$$= \frac{\frac{-8}{3}}{1 - \frac{16}{9}} = \frac{\frac{-8}{3}}{\frac{-7}{9}}$$

$$= \frac{-8}{\cancel{3}_1} \cdot \frac{\cancel{9}^3}{-7} = \frac{-24}{-7} = \boxed{\frac{24}{7}}$$