$$\frac{1}{2\pi}\int_{-\cancel{0,5}\,\pi}^{\pi\,\cancel{0,5}} \frac{3}{5-4\cos(w)}\,dw = 3\int_{-0,5\,\pi}^{\cancel{0,5}\,\pi} \frac{1}{5-4\cos(w)}$$

$$u = 5-4\cos(w) = 4\sin(w)$$

$$u = \frac{1}{5-4\cos(w)} \Rightarrow \frac{-4\sin(w)}{(5-4\cos(w))^2}$$

$$\frac{3}{2\pi}\int_{-\pi}^{\pi} \frac{1}{5-4\cos(w)}\,dw =$$

$$u = \tan\left(\frac{w}{2}\right) \qquad \sin(w) = \frac{2u}{u^2+1}$$

$$du = \frac{dw}{2\cos^2\left(\frac{w}{2}\right)} \qquad \cos(w) = \frac{1-u^2}{u^2+1}$$

$$\Rightarrow dw = \frac{2\,du}{u^2+1}$$

$$\frac{3}{2\pi}\int_{u(-\pi)}^{u(\pi)} \frac{2\,du}{(u^2+1)\left(5-4\left(\frac{1-u^2}{1+u^2}\right)\right)} = \frac{3}{\pi}\int_{u(-\pi)}^{u(\pi)} \frac{du}{9u^2-1} \qquad ds = 3\,du \quad s = 3u$$

$$= \frac{3}{\pi}\int_{-\infty}^{\infty} \frac{du}{9u^2 \cancel{+} -1} = \frac{2\cdot 3}{\pi}\int_{0}^{\infty} \frac{du}{9u^2-1} = \frac{2\cdot 3}{3\pi}\int_{0}^{\infty} \cancel{3}\,\frac{1}{s^2+1} =$$

$$\frac{2}{\pi}\int_0^\infty \frac{1}{\text{[illegible]}}\,\frac{1}{s^2+1} = \left[\tan^{-1}(s)\right]_0^\infty = \frac{2}{\pi}\tan^{-1}(\infty) - \frac{2}{\pi}\tan^{-1}(0)$$

$$= \underline{1}$$