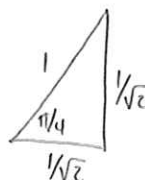


Solution

1. (100 points) Find the equation of the tangent line to the graph of $f(x)$ at $x = \frac{\pi}{4}$ for

$$f(x) = \sqrt{2 \cos^2 x + 3}$$

$$x_0 = \pi/4$$
$$y_0 = f(\pi/4) = \sqrt{2 \left(\frac{1}{\sqrt{2}}\right)^2 + 3} = \sqrt{4} = \boxed{2}$$



So we need to find the equation of the tangent line at the point $(\pi/4, 2)$.

$$f'(x) = \frac{1}{2\sqrt{2\cos^2 x + 3}} \cdot 4\cos x(-\sin x) = -\frac{2\cos x \sin x}{\sqrt{2\cos^2 x + 3}}$$

The slope is given by.

$$m = f'(\pi/4) = -\frac{2\left(\frac{1}{\sqrt{2}}\right)\left(\frac{1}{\sqrt{2}}\right)}{\sqrt{2\left(\frac{1}{\sqrt{2}}\right)^2 + 3}} = \boxed{-\frac{1}{2}}$$

The equation of the tangent line at $x_0 = \pi/4$ is.

$$y = y_0 + m(x - x_0)$$

$$\boxed{y = 2 - \frac{1}{2}(x - \pi/4)}$$