This might be set up differently on the actual test. To evaluate, we must first identify the values of x, y, and r so that we can use $\cos\theta = \frac{x}{r}$ and $\sin\theta = \frac{y}{r}$.

3. Given that $\sec\theta = \frac{5}{3}$ * and $270° < \theta < 360°$, evaluate the following.

$\boxed{\text{so, } \cos\theta = \frac{3}{5} \text{ and } \sin\theta = -\frac{4}{5}.}$

a) $\cos(2\theta)$

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

This is just one of three options.

$= \left(\frac{3}{5}\right)^2 - \left(\frac{-4}{5}\right)^2$

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

b) $\sin(2\theta)$

$= 2\sin\theta\cos\theta$

$= 2 \cdot \frac{-4}{5} \cdot \frac{3}{5}$

$= \boxed{\frac{-24}{25}}$

The actual test might provide a space for solving x, y, and r, before evaluating $\cos(2\theta)$ and $\sin(2\theta)$. For now, look here

* $\sec\theta = \frac{5}{3}$ means $\cos\theta = \frac{3}{5}$ (in QIV).

So, $x = 3$ and $r = 5$. Solve for y (negative in QIV)

$x^2 + y^2 = r^2$

$3^2 + y^2 = 5^2$

$9 + y^2 = 25$

$y^2 = 16$

$y = \pm\sqrt{16} \rightarrow \boxed{y = -4}$ (only)

These numbers are easy to work with. All steps are shown in case test numbers are harder.

4. Prove each identity.

a) $(1 - \cos^2\theta)(1 + \cot^2\theta) = 1$

$\sin^2\theta \cdot \csc^2\theta =$

$\sin^2\theta \cdot \frac{1}{\sin^2\theta} =$

$1 = 1$

QED

b) $\dfrac{\cot\theta\ \tan\theta - \cos^2\theta}{\cos\theta\ \tan\theta} = \sin\theta$

$\dfrac{\frac{\cos\theta}{\sin\theta} \cdot \frac{\sin\theta}{\cos\theta} - \cos^2\theta}{\cos\theta \cdot \frac{\sin\theta}{\cos\theta}} =$

$\dfrac{1 - \cos^2\theta}{\sin\theta} =$

$\dfrac{\sin^2\theta}{\sin\theta} =$

$\sin\theta = \sin\theta$

QED