1. (4 points) Write the function \( h(x) = \frac{2}{\sqrt{x^2 + 4}} \) as the composition of two functions \( f(g(x)) \). Do not use \( f(x) = x \) or \( g(x) = x \).

\[
f(x) = x^2 + 4
\]
\[
g(x) = \frac{2}{\sqrt{x}}
\]

2. (6 points) Solve the equation \( 4e^{2x} + 7 = 17 \) for \( x \).

\[
4e^{2x} = 10
\]
\[
e^{2x} = \frac{5}{2}
\]
\[
\ln(e^{2x}) = \ln\left(\frac{5}{2}\right)
\]
\[
2x = \ln\left(\frac{5}{2}\right) \implies x = \frac{1}{2} \ln\left(\frac{5}{2}\right)
\]

3. (6 points) If \( \tan \theta = -\sqrt{2} \) and \( \theta \) is in the second quadrant, find \( \cos \theta \).

\[
\text{opp} = \sqrt{2} \quad \text{hyp} = 1.3
\]
\[
\tan \theta = \frac{\text{opp}}{\text{adj}}
\]
\[
\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{1}{\sqrt{3}}
\]

4. (4 points) Recall that the Horizontal Line Test says that the function \( f \) has an inverse if and only if no horizontal line intersects the graph of \( f \) more than once. Use what we've learned about functions and inverses to explain why the Horizontal Line Test works.

The graph of \( f^{-1} \) is the reflection of \( f \) about the line \( y = x \). If a horizontal line intersects the graph of \( f \) more than once, then when the graph of \( f \) is reflected about \( y = x \) the horizontal line becomes a vertical line that intersects the graph of \( f^{-1} \) more than once. This means that \( f^{-1} \) can't be a function.