Find the domain and the intervals of concavity of \( g(x) = -\sqrt{4 - x^2} \). First note that \( g \) is defined only when \( 4 - x^2 \geq 0 \) and this turns out to be \(-2 \leq x \leq 2\). To find \( g' \), rewrite \( g \) in fractional exponential form, \( g(x) = -(4 - x^2)^{1/2} \). Now,

\[
g'(x) = -\frac{1}{2}(4 - x^2)^{-1/2}(-2x) = x(4 - x^2)^{-1/2}.
\]

Therefore we can find \( g'' \) by the product rule.

\[
g''(x) = 1(4 - x^2)^{-1/2} + (-\frac{1}{2})(4 - x^2)^{-3/2}(-2x) \cdot x
= (4 - x^2)^{-1/2} + x^2(4 - x^2)^{-3/2}
= (4 - x^2)^{-1/2} \left(1 + x^2(4 - x^2)^{-1}\right)
= \frac{1}{(4 - x^2)^{1/2}} \left(\frac{4 - x^2}{4 - x^2} + \frac{x^2}{4 - x^2}\right)
= \frac{1}{(4 - x^2)^{1/2}} \left(\frac{4}{4 - x^2}\right)
= \frac{4}{(4 - x^2)^{3/2}}
\]

There are two (equivalent) ways to interpret \( r^{3/2} \). One is \( \sqrt{r^3} \) and the other is \( (\sqrt{r})^3 \) and both these result in a positive answer when \( r \) is itself positive. Of course, since the \( 4 - x^2 \) term is in the denominator, we must eliminate both 2 and \(-2\). For all the numbers \( x \in (-2, 2) \), \( g''(x) > 0 \). IE, \( g \) is concave upwards on \((-2, 2)\). Note that the graph of \( g \) is just the bottom half of the circle \( x^2 + y^2 = 4 \).