Name _____________________________

Use the Newton quotient to compute the equation of the line tangent to the curve

\[ y = 4 - x^2 \]

at the point \((-1, 3)\).

Solution.

\[
\begin{align*}
f(x) &= 4 - x^2; \\
f(x + h) &= 4 - (x + h)^2 \\
&= 4 - (x^2 + 2xh + h^2) \\
&= 4 - x^2 - 2xh - h^2; \\
\frac{f(x + h) - f(x)}{h} &= -2x - h; \\
\lim_{h \to 0} \frac{f(x + h) - f(x)}{h} &= -2x.
\end{align*}
\]

Therefore

\[ f'(-1) = 2. \]

The desired equation is

\[ y - 3 = 2(x + 1), \]

or equivalently

\[ y = 2x + 5. \]