1. Using a limit of slopes of secant lines, find the slope of \( y = (x - 1)^2 \) at \( P = (3, 4) \) and the equation of the tangent line through this point.

Solution. Let \( Q \) be the point \((3+h, (3+h-1)^2)\). Notice that \((3+h-1)^2 = (2 + h)^2 = 4 + 4h + h^2\). The slope of the line through \( P \) and \( Q \) is

\[
\frac{(4 + 4h + h^2) - 4}{3 + h - 3} = \frac{4h + h^2}{h} = 4 + h.
\]

Taking the limit as \( h \) approaches 0 gives 4.

So the tangent line has slope 4 and goes through \((3, 4)\). Using the slope-point equation for a line, the tangent line is

\[
y - 4 = 4(x - 3).
\]

This simplifies to \( y = 4x - 8 \).

2. Graph the function \( y = \cos(x + \pi/4) - 3 \). What is its period?

Solution. This function is \( y = \cos(x) \) translated left by \( \pi/4 \) and down by 3. Because it is not scaled, the period of \( y = \cos(x + \pi/4) - 3 \) is the same as that of \( y = \cos(x) \), namely \( 2\pi \).