

Chapter 6 / **Example 41**

Drawing the tangent and normal

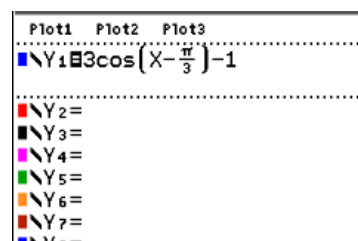
Given the function $y = 3\cos\left(x - \frac{\pi}{3}\right) - 1, -\infty < x < \infty$

at the point P where the graph intersects the y-axis.

- a** Find the equation of the tangent. **b** Find the equation of the normal.
c Verify using your calculator.

Press $[f1]$ $[y=]$ to display the equation entry screen.

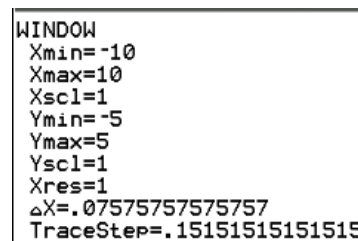
Type $3\cos\left(x - \frac{\pi}{3}\right) - 1$ and press $[enter]$ to enter the equation as Y_1 .



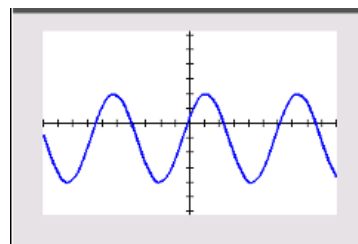
In this question to make the tangent and normal appear to be perpendicular, you want to change the axes to have the same x and y scales. Otherwise the window would distort the graph and alter the angle between the lines.

The square scales always increase the smallest scale so press $[f2]$ $[window]$ and set the axes so that $-5 \leq y \leq 5$ with a scales of 1.

Press $[f3]$ $[zoom]$ 5:ZSquare.

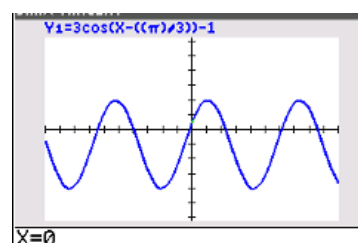


The GDC displays the curve $Y_1 = 3\cos\left(x - \frac{\pi}{3}\right) - 1$ in a suitable window.



To draw the tangent at $x = 0$ press $[2nd]$ $[draw]$ 5:Tangent(.

Type 0 to position the cursor on the point at $x = 0$ and press $[enter]$.

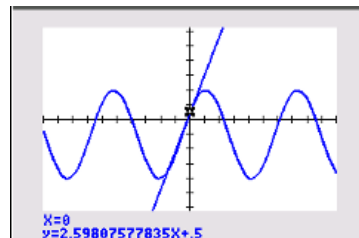


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The GDC displays the function and the tangent at $x = 0$.

The equation of the tangent is $y = 2.60x + 0.5$.



The TI-84 Plus C will not find the equation of the normal directly.

The tangent has gradient 2.60 and meets the curve at $(0, 0.5)$

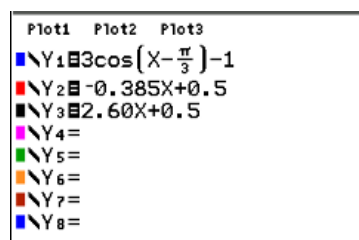
therefore the normal will have gradient $-\frac{1}{2.60} = -0.385$ and will also meet the curve at $(0, 0.5)$.

The equation will be $y = -0.385x + 0.5$.

Press $[F1]$ $[Y=]$ to display the equation entry screen.

Type $-0.385x + 0.5$ and press $[enter]$ to enter the equation as Y_2 .

You will also need to enter $2.60x + 0.5$ in Y_3 .



Press $[F5]$ $[graph]$ to display the graph screen.

The GDC displays the tangent and normal at the point $x = 0$.

