

Answer on Question #46200 – Math – Calculus

Find $\frac{dw}{dt}$ at $t = \frac{\pi}{2}$, where $w = x^2 + y^2 + 2x + 3y, x = \cos t, y = \sin t$.

Solution:

Put $\cos t$ for x and $\sin t$ for y :

$$w = (\cos t)^2 + (\sin t)^2 + 2 \cos t + 3 \sin t$$

$$(\cos t)^2 + (\sin t)^2 = 1$$

$$w = 1 + 2 \cos t + 3 \sin t$$

$$(\sin t)' = \cos t, (\cos t)' = -\sin t$$

$$\frac{dw}{dt} = -2 \sin t + 3 \cos t$$

$\frac{dw}{dt}$ at $t = \frac{\pi}{2}$:

$$\frac{dw}{dt} \left(t = \frac{\pi}{2} \right) = -2 \sin \frac{\pi}{2} + 3 \cos \frac{\pi}{2} = -2$$

Answer: $\frac{dw}{dt} \left(t = \frac{\pi}{2} \right) = -2$