A particle is moving along a curve \( y = \sqrt{3x} + 1 \). As the particle passes through the point \((1,2)\) its x-coordinate is increasing at 3 cm/s. How fast is the distance from the particle to the origin changing at this instant?

\[
\frac{dx}{dt} = 3 \text{ cm/s}
\]

when \( x = 1, y = 2 \)

\[
\frac{dD}{dt} = ? \text{ when } x = 1, y = 2
\]

\[
D(x,y) = \sqrt{(x-x_0)^2 + (y-y_0)^2}
\]

\[
D(x,y) = \sqrt{(x-0)^2 + (y-0)^2}
\]

\[
D = \sqrt{x^2 + y^2}
\]

\[
y = \sqrt{3x} + 1
\]

\[
D = \sqrt{x^2 + (\sqrt{3x} + 1)^2}
\]

\[
D = \sqrt{x^2 + 3x + 1}
\]

\[
D^2 = x^2 + 3x + 1
\]

\[
2D \frac{dD}{dt} = 2x \frac{dx}{dt} + 3 \frac{dy}{dt}
\]

\[
\sqrt{5} \quad 1 \quad 3 \quad 3
\]

\[
2 \sqrt{5} \frac{dD}{dt} = 2(1)(3) + 3(3)
\]

\[
\frac{dD}{dt} = \frac{15}{\sqrt{5}}
\]
A particle is moving along a curve \( y = \sqrt{3}x + 1 \). As the particle passes through the point \((1, 2)\) its \( x \)-coordinate is increasing at 3 cm/s. How fast is the distance from the particle to the origin changing at this instant?

\[
\frac{dx}{dt} = 3 \text{ cm/s when } x = 1, y = 2
\]

\[
\frac{dD}{dt} = \ ? \text{ when } x = 1, y = 2
\]

\[
D(x, y) = \sqrt{(x-x_0)^2 + (y-y_0)^2}
\]

\[
D(x, y) = \sqrt{(x-0)^2 + (y-0)^2}
\]

\[
D = \sqrt{x^2 + y^2}
\]

\[
y = \sqrt{3}x + 1
\]

\[
D = \sqrt{x^2 + (\sqrt{3}x + 1)^2}
\]

\[
D = \sqrt{x^2 + 3x + 1}
\]

\[
D^2 = x^2 + 3x + 1
\]

\[
2D \frac{dD}{dt} = 2x \frac{dx}{dt} + 3 \frac{dy}{dt}
\]

\[
\frac{dD}{dt} = \frac{15}{2\sqrt{5}}
\]