

(800_2) Find dz/dt when $Z = x^2y^3$, $x = 1 + \sqrt{t}$ and $y = 1 - \sqrt{t}$

Solution:

$$\frac{dz}{dt} = z_x \frac{dx}{dt} + z_y \frac{dy}{dt} = 2xy^3 \frac{1}{2\sqrt{t}} - 3x^2y^2 \frac{1}{2\sqrt{t}} = \frac{xy^2}{2\sqrt{t}} (2y - 3x) =$$

$$-\frac{(1-t)(1-\sqrt{t})(1+5\sqrt{t})}{2\sqrt{t}}$$