CHAIN RULE

If $x = t^3$ and $y = \sin t$, use the chain rule to find $\frac{dz}{dt}$. Show your work!

1. $z = f(x, y) = x^3 y^2$

2. $z = f(x, y) = \sin(x^3 y^2)$

3. $z = f(x, y) = \sqrt{x^3 y^2}$

4. $z = f(x, y) = \sec(x^3 y^2)$

5. $z = f(x, y) = \tan(x^3 y^2)$

6. $z = f(x, y) = \sin^{-1}(x^3 y^2)$

7. Use the chain rule to find $\frac{\partial z}{\partial t}$ for $z = x^2 y$, $x = \sin(st)$, and $y = t^2 + s^2$.

8. Use the chain rule to find $\frac{\partial z}{\partial s}$ for $z = x^2 y^2$, $x = st$, and $y = t^2 - s^2$.

9. If $E = IR$ (voltage = current $\times$ resistance), and if all of these quantities are changing over time *t*, then use the chain rule to write down a formula for the rate at which voltage changes over time.