

CHAIN RULE DIAGRAMS

Construct a tree diagram and a chain rule formula for each of the indicated derivatives.

1. $z = f(x, y)$, $x = x(u, v)$, $y = y(u, v)$, $\frac{\partial z}{\partial u} = ?$

2. $z = f(x, y)$, $x = x(u, v)$, $y = y(u, v)$, $u = u(s, t)$, $v = v(s, t)$, $\frac{\partial z}{\partial s} = ?$

3. $z = f(x, y)$, $x = x(t)$, $y = y(t)$, $\frac{dz}{dt} = ?$

4. $w = f(x, y, z)$, $x = x(t, u, v)$, $y = y(t, u, v)$, $z = z(t, u, v)$, $\frac{\partial w}{\partial t} = ?$

5. $w = f(x, y, z)$, $x = x(u, v)$, $y = y(u, v)$, $z = z(u, v)$, $u = u(s)$, $v = v(t)$, $\frac{\partial w}{\partial t} = ?$