Chain Rule

Computation Graph.

$J(a,b,c) = 3(a+bc) = 3(5+3\times 2) = 33.$

u

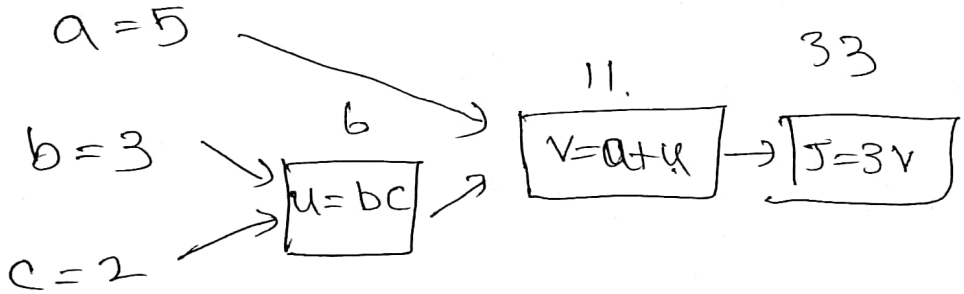
v

J.

$u = bc$

$v = a+u$

$J = 3v$



$$\frac{dJ}{da} = \frac{dJ}{dv} * \frac{dv}{da} \qquad \frac{dJ}{dv} = 3 \qquad \frac{dv}{da} = 1.$$

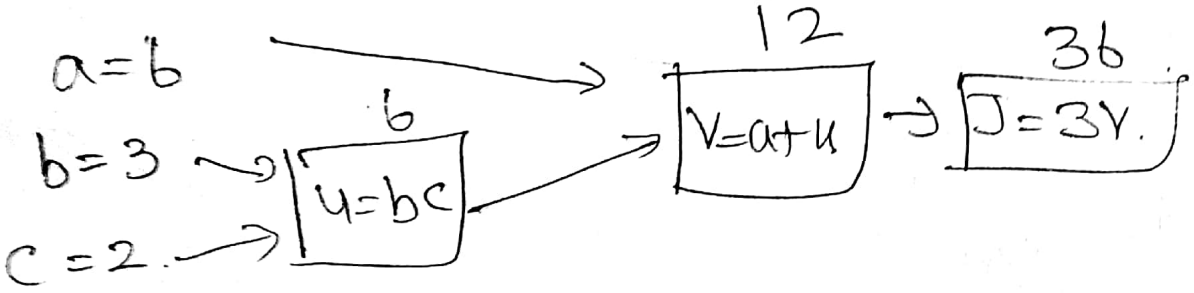
$$\frac{\partial J}{\partial a} = 3 * 1$$

if a changes the J changes 3 times with respect to a.

$a = 5.001$

$v = 11.001 \quad \frac{\partial v}{\partial a} = 1$

$J = 33.003. \quad \frac{\partial J}{\partial a} = 3.$



$a = 6$ $\quad$ $a = 5$

$V = 12$ $\quad \frac{\partial V}{\partial a} = 1$ $\quad V = 11$

$J = 36$ $\quad \frac{\partial J}{\partial a} = 3$ $\quad J = 33$

So we can conclude that when a changes one step the J changes 3 times with respect to a. So this is called chain rule.