Computation graph

$J(a,b,c) = 3(a+bc)$

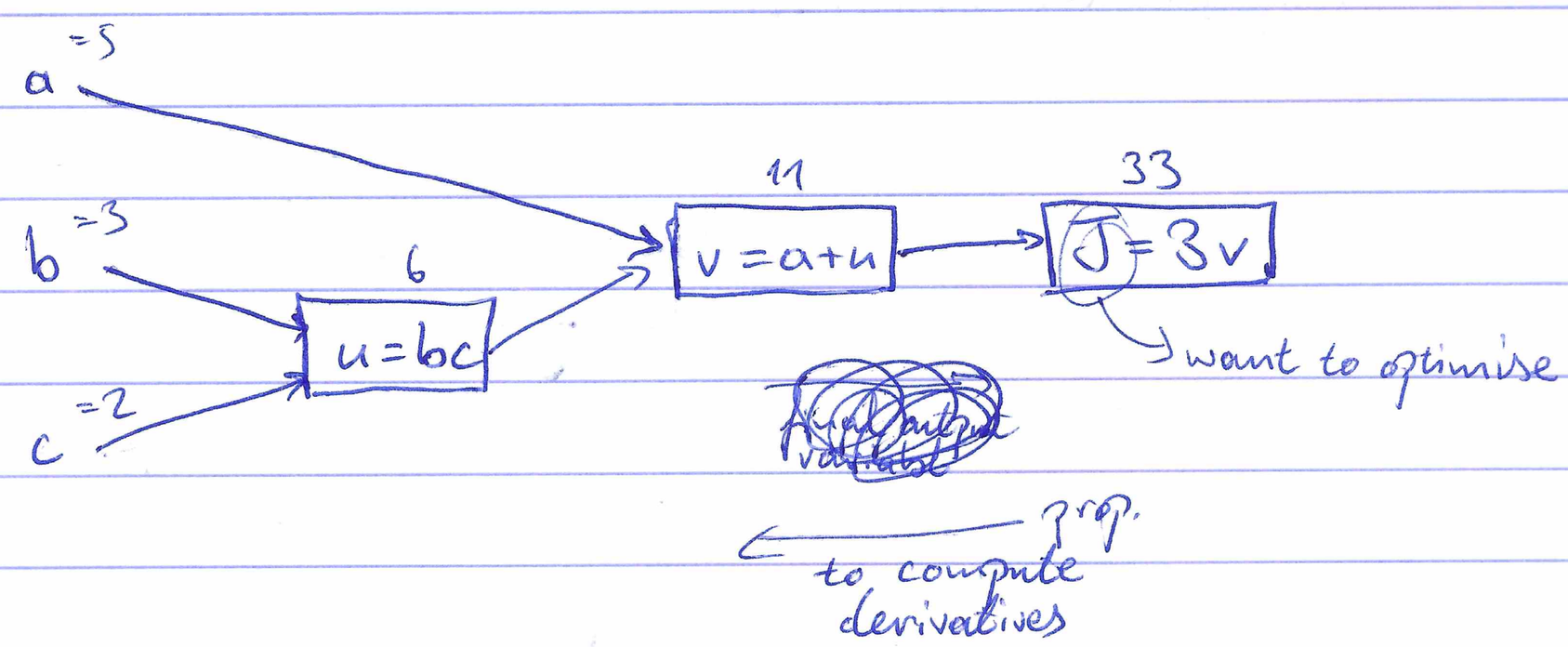
To compute this function:

$u = bc$

$v = a+u$

$J = 3v$

Draw steps in a graph:



Derivatives with a computation graph

$\frac{dJ}{dv} = ?$

$J = 3v$

$v = 11 \rightarrow 11.001$

$J = 33 \rightarrow 33.003$

$\therefore \frac{dJ}{dv} = 3$

$\frac{dJ}{da} = ?$

$\frac{dJ}{da} = 3 = \frac{dJ}{dv}\frac{dv}{da}$

$\frac{dv}{da} = 1$

$a = 5 \rightarrow 5.001$

$v = 11 \rightarrow 11.001$

$J = 33 \rightarrow 33.003$

$f(a) = 3a$

$\frac{df(a)}{da} = \frac{df}{da} = 3$

$\frac{d(\text{Final Output Var})}{d(\text{Var})}$ $\quad \frac{dJ}{d(\text{Var})}$

$\rightarrow$ d(var)