



deeplearning.ai

# Basics of Neural Network Programming

---

## Computation Graph

# Computation Graph

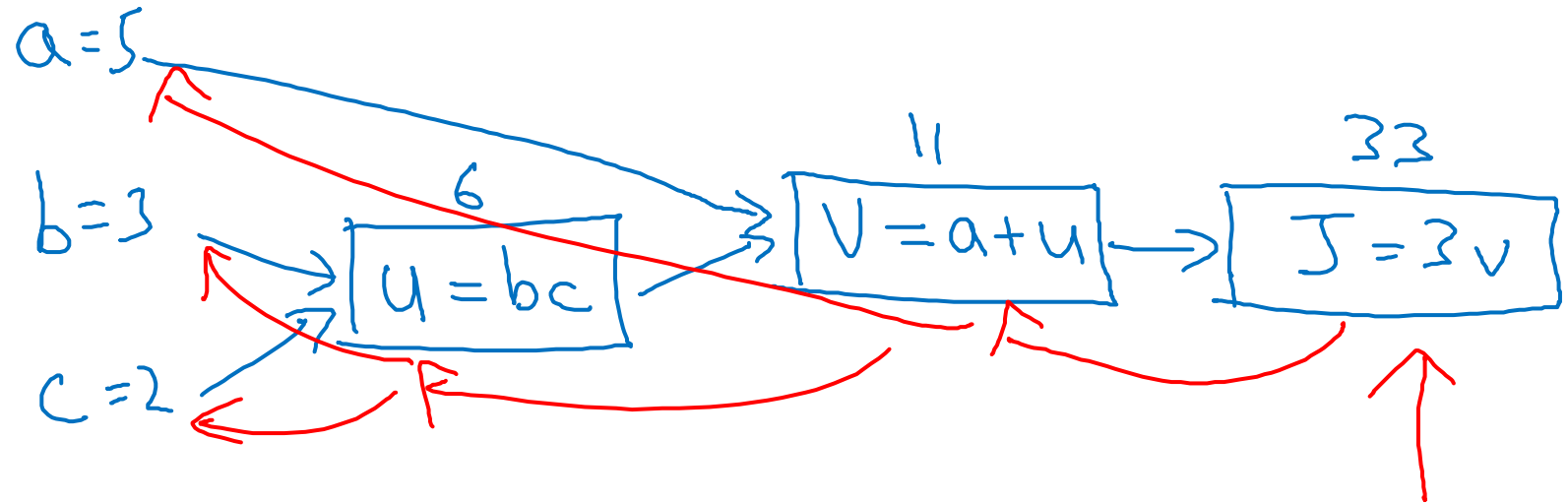
$$J(a,b,c) = 3(a + \underbrace{bc}_u) = 3(5 + 3 \times 2) = 33$$

$\underbrace{\hspace{1.5cm}}_J$

$$u = bc$$

$$V = a + u$$

$$J = 3V$$





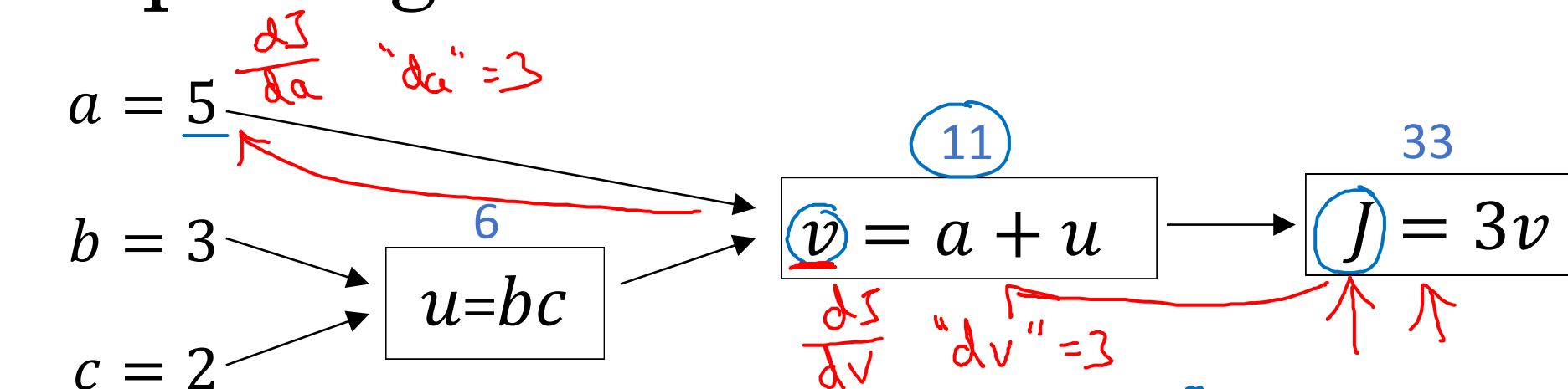
deeplearning.ai

# Basics of Neural Network Programming

---

## Derivatives with a Computation Graph

# Computing derivatives



$$\boxed{\frac{dJ}{dv} = ? = 3}$$

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

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

$3 \times 1$

$$a \rightarrow v \rightarrow J$$

$$J = 3v$$

$$v = 11 \rightarrow 11.001$$

$$J = 33 \rightarrow 33.003$$

$$a = 5 \rightarrow 5.001$$

$$\rightarrow v = 11 \rightarrow 11.001$$

$$J = 33 \rightarrow 33.003$$

$$\boxed{\frac{d \text{ Final Output Var}}{d \text{ var}}}$$

$\frac{dJ}{dv}$   
 $"dvar"$

$$\boxed{f(a) = 3a}$$

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

$$\boxed{J = 3v}$$

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

# Computing derivatives

