Given:
$\hat{y} = O = R_4(P_4)$
$P_4 = H_3 w_4$
$H_3 = R_3(P_3)$
$P_3 = H_2 w_3$
$H_2 = R_2(P_2)$
$P_2 = H_1 w_2$
$H_1 = R_1(P_1)$
$P_1 = x w_1$
$C = \frac{1}{2}(\hat{y} - y)^2$

1 Find $\frac{d}{dw_4}[C]$:

$=(\hat{y} - y)\frac{d}{dw_4}\hat{y}$
$= (\hat{y} - y)\frac{d}{dw_4}[R_4(P_4)]$
$= (\hat{y} - y)R_4\acute{}(P_4)\frac{d}{dw_4}[H_3 w_4]$
$= (\hat{y} - y)R_4\acute{}(P_4)H_3$

2 Find $\frac{d}{dw_3}[C]$:

$=(\hat{y} - y)R_4\acute{}(P_4)\frac{d}{dw_3}[H_3 w_4]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4\frac{d}{dw_3}[H_3]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4\frac{d}{dw_3}[R_3(P_3)] = (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)\frac{d}{dw_3}[P_3]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)\frac{d}{dw_3}[H_2 w_3]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)H_2$

3 Find $\frac{d}{dw_1}[C]$:

$=(\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)\frac{d}{dw_3}[H_2 w_3]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3\frac{d}{dw_1}[H_2]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3\frac{d}{dw_1}[R_2(P_2)]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3 R_2\acute{}(P_2)\frac{d}{dw_1}[P_2]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3 R_2\acute{}(P_2)\frac{d}{dw_1}[H_1 w_2]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3 R_2\acute{}(P_2)w_2\frac{d}{dw_1}[R_1(P_1)]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3 R_2\acute{}(P_2)w_2 R_1\acute{}(P_1)\frac{d}{dw_1}[P_1]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3 R_2\acute{}(P_2)w_2 R_1\acute{}(P_1)\frac{d}{dw_1}[x w_1]$
$= (\hat{y} - y)R_4\acute{}(P_4)w_4 R_3\acute{}(P_3)w_3 R_2\acute{}(P_2)w_2 R_1\acute{}(P_1)x$

4 Output layer error

$\hat{y} - y$

5 Find $\frac{d}{dP_2}[C]$:

$=(\hat{y} - y)R_4'(P_4)w_4R_3'(P_3)w_3\frac{d}{dP_2}[R_2(P_2)]$
$= (\hat{y} - y)R_4'(P_4)w_4R_3'(P_3)w_3R_2'(P_2)$