1) $\Delta C_1 = \frac{\partial C}{\partial S}\Big|_{S_0,0}(S-S_0)$

$\Delta C_2 = \frac{\partial C}{\partial S}\Big|_{S_0,0}(S-S_0) + \frac{1}{2}\frac{\partial^2 C}{\partial S^2}\Big|_{S_0,0}(S-S_0)^2$

$\sigma = 0.3 \quad S_0 = 60 \quad r = 0.04 \quad K = 79 \quad T = \frac{3}{4} \quad S = 64$

$d_1 = \frac{\ln(60/71) + (0.04 + \frac{1}{2}(0.3)^2)(\frac{3}{4})}{0.3\sqrt{\frac{3}{4}}} = -0.8135$

$d_2 = d_1 - 0.3\sqrt{\frac{3}{4}} = -1.0733$

$\Delta C_1 = \Phi(-0.8135)(64-60) = \$0.83$

$\Delta C_2 = 0.83 + \frac{1}{2}\frac{e^{-\frac{(-0.8135)^2}{2}}}{60\sqrt{2\pi(0.3)^2(\frac{3}{4})}}(4)^2 = \$0.98$

$\Delta C = 64\Phi\left(\frac{\ln(64/79) + (0.04 + \frac{1}{2}(0.3)^2)(\frac{3}{4})}{0.3\sqrt{\frac{3}{4}}}\right)$

$-79e^{-0.04(\frac{3}{4})}\Phi\left(\frac{\ln(64/79) + (0.04 - \frac{1}{2}(0.3)^2)(\frac{3}{4})}{0.3\sqrt{\frac{3}{4}}}\right)$

$-60\Phi(d_1) + 79e^{-0.04(\frac{3}{4})}\Phi(d_2)$

$= \$0.99$

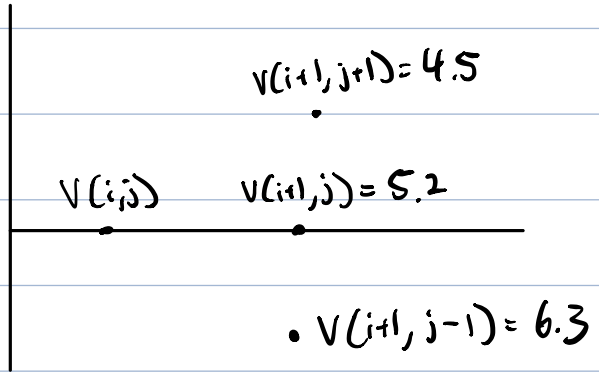
The estimate using both delta and gamma is closer to the actual.

2) $\text{Delta} = 1(\Delta C) + n\left(\frac{dS}{dS}\right) = 0$

$n = -0.21$

Sell 0.21 of ABW stock

3) a)



Put option. As S increases, V decreases

b) $h = \frac{1}{12}$ $K = 0.1$ $r = 0.1$ $\sigma = 0.3$

$$P_1 = \frac{(0.3)^2/12}{2(0.1)^2} + \left(0.1 - \frac{(0.3)^2}{2}\right)\left(\frac{1/12}{2(0.1)}\right) = 0.3479$$

$$P_2 = 1 - \frac{(0.3)^2/12}{(0.1)^2} = 0.25$$

$$P_3 = \frac{(0.3)^2/12}{2(0.1)^2} - \left(0.1 - \frac{(0.3)^2}{2}\right)\left(\frac{1/12}{2(0.1)}\right) = 0.3521$$

$$V(i,j) = \frac{1}{1+(0.1/12)}\left(0.3979(4.5) + 0.25(5.2) + 0.3521(6.3)\right)$$

$= \$5.26$