Assume a stock worth $100 will rise by 20% or fall by 10% by one year from today. Assume also that the risk-free interest rate is 2%.

a. What is the value of a call with a $110 strike price?
b. What investments would be required to create a portfolio that duplicates the payoff on the put?
c. What would be the payoff on each part of the portfolio (in part b) if the stock rises 20%?
d. What would be the payoff on each part of the portfolio (in part b) if the stock falls 10%?

Wall Street Journal Questions are on the back of this page.

\[ S_0 = 100 \times (1.2) = 120, \quad S_d = 100 \times (0.9) = 90 \]

\[ C_0 = 10 \times C_d = 0 \]

\[ \Delta = \frac{0 - 0}{120 - 90} = \frac{1}{3}, \quad B = \frac{0 - 90(\frac{1}{3})}{1.02} = -29.4118 \]

\[ C = 100 \times (\frac{1}{3}) - 29.4118 \times 3.9216 = 3.9216 \]

b. (Buy \( \frac{1}{3} \) of a share) & (Short-sell 29.4118 of risk-free bonds)

c. \[ \text{Stock} = 40 = \frac{5}{3} \times 120 \]
\[ \text{Bond} = -30 = -29.4118 \times 1.02 \]

d. \[ \text{Stock} = 30 = \frac{5}{3} \times 90 \]
\[ \text{Bond} = -30 = -29.4118 \times 1.02 \]