27. Can be calculated using risk-neutral probabilities of stock price changes and option payoffs.

Let p_1^*, p_2^* and p_3^* be the probabilities of outcome 1, 2, and 3, respectively. Y only has value under outcome 3, so

$$\underbrace{300\, p_3^*}_{\text{expected value of future price of Y at } t=1} = \underbrace{100 e^{.10}}_{\text{current price of Y, accumulated}} \longrightarrow p_3^* = e^{.1}/3 = .36839$$

X has value under outcomes 1 and 2, so

$$200 p_1^* + 50 p_2^* = 100 e^{.1}$$

where $p_1^* + p_2^* + p_3^* = 1$, so

$$200 p_1^* + 50(1 - p_1^* - p_3^*) = 100 e^{.1}$$

$(p_3^* = .36839)$

$$200 p_1^* + 50(.63161 - p_1^*) = 100 e^{.1}$$

$$150 p_1^* = 100 e^{.1} - 31.5805$$

$$p_1^* = .526244$$

$$p_2^* = 1 - .526244 - .36839 = .105366$$

Next, determine the payoffs under each outcome for value of $P_y - C_x$:

Outcome 1:

$$P_y - C_x = \max(0, \overset{K}{95} - \overset{S_y}{0}) - \max(0, \overset{S_x}{200} - \overset{K}{95})$$

$$= 95 - 105.$$

$$= -10$$

Outcome 2:

$$P_y - C_x = \max(0, 95-0) - \max(0, 50-95)$$

$$= 95 - 0$$

$$= 95$$

Outcome 3:

$$P_y - C_x = \max(0, 95-300) - \max(0, 0-95)$$

$$= 0 - 0$$

$$= 0$$

Now use the risk-neutral probabilities to calculate the expected value of $P_y - C_x$ (discounted to today):

$$P_y - C_x = e^{-.1}(-10 p_1^* + 95 p_2^*) = 4.2955$$