Sample Problem 8 Solution.
Examine the following two-period binomial model:
\( S_0 = 200 \)
\( U = 1.1 \)
\( D = 0.92 \)
\( R = (1+r) = 1.01 \) per period
Present value of $1 to be received at \( T \) is \((1+r)^2 = 0.9803\).

Risk neutral probability, \( \pi = (R-D)/(U-D) = (1.01-0.92)/(1.10-.92) = .09/.18 = 1/2 \)

Use risk-neutral probabilities to find the following values:

a) Call with exercise price of $250
\( C_{250} = 0 \)

b) Call with exercise price of $240
\[
C_{240} = B(0,T) \pi^2 C_{UU} = 0.9803 \times 0.25 = 0.49
\]

c) Call with exercise price of $230
\[
C_{230} = B(0,T) \pi^2 C_{UU} = 0.9803 \times 0.25 \times 12 = 2.94
\]

d) Call with exercise price of $200

\[
C_{200} = B(0,T)[ \pi^2 C_{UU} + 2\pi(1-\pi)C_{UD}] =
= 0.9803 \times 0.25 \times 42 + 0.5 \times 2.4 = 11.47
\]

e) Put with exercise price of $200
\[
P_{200} = B(0,T)[(1-\pi)^2 P_{DD}] = 0.9803 \times 0.25 \times 30.72 = 7.53
\]
Or, use Put-Call Parity: \( S + P = C + PV(K) \),
so \( P_{200} = C_{200} + PV(200) - S \)
\[ P_{200} = \$11.47 + \$196.06 - \$200 = \$7.53 \]