

# Stochastic Calculus and Finance

## Übungen

### Teil 2

#### Problem 3

Suppose the monthly price evolution of Stock  $S$  is given by  $\Delta S_n = S_{n-1}\rho_n, n = 1, 2, \dots$ , where returns  $\rho_n$  are i.i.d. with values 0.2 and  $-0.1$  with probabilities 0.4 and 0.6. Given  $S_0 = \$300$ , find the predicted mean price of  $S$  for next 3 months.

#### Problem 4

Consider a single-period  $(B, S)$ -market with  $B_0 = 1, S_0 = 10, r = 0,2$  and

$$S_1(\omega_1) = 6, S_1(\omega_2) = 12, S_1(\omega_3) = 18$$

Find risk-neutral probability  $P^*$ .

#### Problem 5

An investor buys two European put options with strike price \$40 and one European call option with strike price \$50 on the same stock  $S$  with the same expiry date  $N$ . The total price of these options is \$10. Write down the gain-loss function and discuss the possible outcomes.