

# Final practice

Name: \_\_\_\_\_

**Short answer problems - write a sentence and formula for each question.**

1. Define arbitrage opportunity.
2. Define Risk Neutral measure.
3. Define replicating portfolio.
4. Define Bond, interest, Coupons, etc.
5. Define the minimum risk portfolio and market portfolio.
6. Define American, European, Call and Put options.

7. Consider the market of 3 securities, with values at time 0:  $S_1(0) = 40$ ,  $S_2(0) = 80$ , and  $S_3(0) = 180$ . The interest over one step is  $r = .05$ . The values of the security after the time step Determine if there is an arbitrage opportunity, and if so find it.

<i>Security #</i>	$\omega_1$	$\omega_2$	$\omega_3$	$\omega_4$
1	48	44	42	38
2	76	96	88	84
3	198	162	207	198

8. Consider the market of 3 securities, with values at time 0:  $S_1(0) = 150$   $S_2(0) = 100$   $S_3(0) = 200$ . The interest over one step is  $r = .05$ . The values of the security after the time step Determine if there is an arbitrage opportunity, and if so find it.

	$\omega_1$	$\omega_2$	$\omega_3$
$S_1(1)$	150	177	159
$S_2(1)$	118	100	100
$S_3(1)$	212	176	224

9. Let a security with time zero value  $S(0) = 100$ . Time steps  $S(t + 1) = S(t)(1 + M_{t+1})$  where  $M_{t+1} \in \{-.1, .1\}$ . Interest rate  $r = .05$ . Consider European call with expiry  $N = 3$  and strike price  $X = 100$ , value the call.

## Solve

10. Let a security with time zero value  $S(0) = 100$ . Time steps  $S(t + 1) = S(t)(1 + M_{t+1})$  where  $M_{t+1} \in \{-.1, .1\}$ . Interest rate  $r = .05$ . Consider American put with expiry  $N = 3$  and strike price  $X = 100$ , value the put.