

Unit 12 - Week 9: Optimal Portfolio and Consumption- II

Course outline

How does an NPTEL online course work?

MATLAB

Week 0: Prerequisite

Week 1: Basics of Probability Theory

Week 2: Basics of Financial Markets

Week 3: Mean-Variance Portfolio Theory

Week 4: Mean-Variance Portfolio Theory- II

Week 5: Non-Mean-Variance Portfolio Theory

Week 6: Non-Mean-Variance Portfolio Theory- II

Week 7: Non-Mean-Variance Portfolio Theory- III

Week 8: Optimal Portfolio and Consumption

Week 9: Optimal Portfolio and Consumption- II

Lec 1: Continuous time model; Hamilton-Jacobi-Bellman PDE

Lec 2: Hamilton-Jacobi-Bellman PDE; Duality/Martingale Approach

Lec 3: Duality/Martingale Approach in Discrete and Continuous Time

Quiz : Assignment 9

Feedback form

Assignment Solution

Week 10: Bond Portfolio Management

Week 11: Risk Management

Week 12: Applications with market data

Live Session: Mathematical Portfolio Theory

Text Transcripts

Assignment 9

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-11-18, 23:59 IST.

1) If the gBm model is given by $S(t) = S(0)e^{(\mu - \frac{1}{2}\sigma^2)t + \sigma B(t)}$, then which of the following is/are true? 1 point

- $h(t)$ follows normal distribution with mean 0 and variance 1
- $h(t)$ follows normal distribution with mean 0 and variance \sqrt{t}
- $h(t)$ follows normal distribution with mean 0 and variance t
- $h(t)$ follows normal distribution with mean 0 and variance $\sigma^2 t$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $h(t)$ follows normal distribution with mean 0 and variance t

2) If the stock and the bond follow $dS(t) = \mu S(t)dt + \sigma S(t)dW(t)$ and $dB(t) = \mu B(t)dt$, respectively, then which of the following gives the model for a portfolio, where an amount of π out of $X(t)$ is invested in stocks and $X(t) - \pi$ is invested in bonds. 1 point

- $dX(t) = (rX(t) + \pi(\mu - r))dt + \pi\sigma dW(t)$
- $dX(t) = (\mu X(t) + \pi(\mu - r))dt + \pi\sigma dW(t)$
- $dX(t) = (\mu X(t) + \pi(\mu - r))dt + r\sigma dW(t)$
- $dX(t) = \mu X(t)dt + \pi\sigma dW(t)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $dX(t) = \mu X(t)dt + \pi\sigma dW(t)$

3) If $\mu = r$, then the HJB equation reduces to which of the following : 1 point

- $V_t + \frac{\theta^2}{2} \frac{V_x^2}{V_{xx}} + rxV_x = 0$
- $V_t - \frac{\theta^2}{2} \frac{V_x^2}{V_{xx}} + rxV_x = 0$
- $V_t + rxV_x = 0$
- $V_t + \frac{\theta^2}{2} \frac{V_x^2}{V_{xx}} = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $V_t + rxV_x = 0$

4) If the stock follows the price process $dS(t) = 3S(t)dt + 2S(t)dW(t)$ and the bond follows the price process $dB(t) = B(t)dt$, then the HJB equation is given by : 1 point

- $V_t - \frac{V_x^2}{V_{xx}} + xV_x = 0$
- $V_t - \frac{1}{2} \frac{V_x^2}{V_{xx}} + xV_x = 0$
- $V_t - \frac{V_x^2}{V_{xx}} + \frac{1}{2}xV_x = 0$
- $V_t - \frac{1}{2} \frac{V_x^2}{V_{xx}} + \frac{1}{2}xV_x = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
 $V_t - \frac{1}{2} \frac{V_x^2}{V_{xx}} + xV_x = 0$

5) If the stock follows the price process $dS(t) = 3S(t)dt + 2S(t)dW(t)$ and the bond follows the price process $dB(t) = 1.5B(t)dt$, and the investor has log utility, then the optimal portfolio of wealth $\hat{\pi}$ at time $t = 0$ (up to time $t = 1$), invested in stock equals :

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.35,0.40

1 point

6) If the stock follows the price process $dS(t) = 3S(t)dt + 2S(t)dW(t)$ and the bond follows the price process $dB(t) = 1.5B(t)dt$, and the investor has the utility $U(x) = 1 - e^{-2x}$, then the optimal portfolio of wealth $\hat{\pi}$ at time $t = 0$ (up to time $t = 1$), invested in stock equals :

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.035,0.045

1 point

7) If we consider the HJB framework for an investor with log utility, then the optimal consumption at time $t = 0$ with wealth $X(0) = 1000$, up to time $t = 1$, equals :

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 499,501

1 point

8) If $\tilde{Z}(1) := \frac{3}{2} \frac{U'(\hat{X}(1))}{E[U'(\hat{X}(1))]}$, then $E\left[\frac{1}{6}\tilde{Z}(1)\right]$ equals :

Hint

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.245,0.255

1 point