Unit 9 - Week 7

Assignment 7

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

Due on 2020-03-18, 23:59 IST.

1) Let $z(x) := E(\int_0^\infty e^{-t/2} \sin(x + W_t)dt)$. Find the correct statements from below — *3 points*

- z solves $z''(x) = z(x) - 2\sin(x)$
- z solves $z''(x) = z(x) - \sin(x)$
- z solves $\frac{z''(x)}{2} = z(x) - \sin(x)$
- z'' has countably infinitely many point of discontinuities
- z'' has only finitely many point of discontinuities
- z'' has no point of discontinuities

No, the answer is incorrect.
Score: 0

Accepted Answers:
z solves $z''(x) = z(x) - 2\sin(x)$
z'' has no point of discontinuities

2) If the equation $dS_t = \mu S_t dt + \sigma S_t dW_t$, $S_0 = 1$ is satisfied by the process S, then — *3 points*

- $\ln S_t = \sigma W_t + \mu t$
- $\ln S_t = \sigma W_t + (\mu - \frac{\sigma^2}{2})t$
- $S_t = \exp(\sigma W_t + \mu t)$
- $S_t = \exp(\sigma W_t + (\mu + \frac{\sigma^2}{2})t)$
- $S_t = \exp(\sigma W_t + (\mu - \frac{\sigma^2}{2})t)$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\ln S_t = \sigma W_t + (\mu - \frac{\sigma^2}{2})t$
$S_t = \exp(\sigma W_t + (\mu - \frac{\sigma^2}{2})t)$

3) Let $(\Omega, \mathcal{F}, \{\mathcal{F}_t\}, P)$ be a filtered probability space and W denote the Brownian motion, adapted to it. If $X := \{X_t\}_{t\in[0,1]}$ satisfies, $dX_t = \frac{1-X_t}{1-t}dt + dW_t$ with $X_0 = 0$, then identify the correct statements — *4 points*

- X is called a Brownian bridge from 0 to 1
- X is called a Brownian bridge from 1 to 0
- $\max_{t\in[0,1]} X_t < \infty$ a.s
- $X_1 = 1$ a.s
- $X_t \geq 0$ for all $t \in [0,1]$
- X is a martingale w.r.t. $\{\mathcal{F}_t\}$
- Y is a martingale w.r.t. $\{\mathcal{F}_t\}$, where $Y_t := X_t - t$, for $t < 1$
- Y is a martingale w.r.t. $\{\mathcal{F}_t\}$, where $Y_t := \frac{X_t - t}{1-t}$ for $t < 1$

No, the answer is incorrect.
Score: 0

Accepted Answers:
X is called a Brownian bridge from 0 to 1
$\max_{t\in[0,1]} X_t < \infty$ a.s
$X_1 = 1$ a.s
Y is a martingale w.r.t. $\{\mathcal{F}_t\}$, where $Y_t := \frac{X_t - t}{1-t}$ for $t < 1$