**KAI WEN TAY**

**FINM 33000: Homework 5 Solutions**

**Problem 1**

Let be a Brownian motion such that:

1. Let and . Let . Then, and .

We can use Ito’s to derive the following:

1. Let and . Let . Then, . We can then derive the following:
2. Drift term, . Since and , is not martingale.

**Problem 2**

We are given:

1. Using , we can see that this is a variation for , i.e. is an Ito process with :

We can rewrite the following in integral expression, i.e.:

Further simplifying:

Hence, given some time and as of time :

1. Taking the last equation, and using our definition, we know that our equation’s first two terms are the mean and the last term is variance.

Simplifying the second term:

Using the additional information for part (b), term 3 has mean 0.

Hence:

Then:

**Problem 3**

For each item:

1. ,
2. ,
3. ,
4. ,
5. ,
6. ,