11) It is given that Z(t) is a normally distributed random variable with

$E[Z] = \mu = 0$ and ~~E~~ $Var(Z) = \sigma^2 = 1$

$Var(Z) = E[Z^2] - (E[Z])^2$

$E[Z]^2 - \mu^2$

$E[Z^2] - 0$

$E[Z^2] = \sigma^2 = 1$

$E[Z^2] = 1$

Now, we are given another distribution

$X = \sqrt{t} Z$

$E[X] = E[\sqrt{t} Z]$

we know that $E[aY] = aE[Y]$, so

$E[X] = \sqrt{t}\, E[Z] = 0$

$\mu_x = 0$

Now, $Var(X) = Var(\sqrt{t} Z)$

We know $Var(aY+b) = a^2 Var(Y)$

$Var(X) = Var(\sqrt{t} Z)$

$= (\sqrt{t})^2 Var(Z)$

$t(1) = t$

$\boxed{\sigma_x^2 = t}$

So, the random variable X has mean $(\mu_x) = 0$ and with variance $(\sigma_x^2) = t$

Now, we analyze $X(t)$ and discover that it is not a brownian motion

$t_1 < t_2 \le t_3 < t_4$

$X(t_2) - X(t_1) = (\sqrt{t_2} - \sqrt{t_1}) Z$ is not independent

of $X(t_4) - X(t_3) = (\sqrt{t_4} - \sqrt{t_3}) Z$ as both

are multiples of same sample value Z drawn from N(0) population

Secondly, the distribution of $(\sqrt{t_2} - \sqrt{t_1}) Z$ is normal with t.

$\boxed{X(t) \text{ is not a brownian motion}}$