1. Suppose that a stochastic process counts how many people have used an ATM machine each day, as a function of time since midnight.

a) Is this a discrete- or continuous-time process?

continuous-time

b) Is this a discrete- or continuous-value process?

discrete-value

2. Consider the stochastic process $X(t) = A \cos(2\pi t)$, where $A$ is a random amplitude that has a Gaussian distribution with mean 0 and SD 0.5.

a) Determine the probability distribution of $X(0)$.

$X(0) = A \cos(0) = A$, which has a Gaussian distribution with mean 0 and SD 0.5.

b) Determine the probability distribution of $X(0.25)$.

$X(0.25) = A \cos(\pi/2) = A \times 0 = 0$, so this random variable is equal to 0 with probability 1.

c) Determine the probability distribution of $X(7/3)$.

$X(7/3) = A \cos(14\pi/3) = A \times (-0.5)$. Any linear function of a Gaussian distribution also has a Gaussian distribution, so $-0.5A$ has a Gaussian distribution with mean $0(-0.5) = 0$ and SD $0.5(|-0.5|) = 0.25$. 