Assignment1

1. What are the three axioms of probability theory?
2. What is a random variable?
3. Define Probability Density Function for a continuous random variable.
4. Name any two discrete distributions and two continuous distribution.
5. Define expectation in the context of a continuous random variable.
6. What is the value of the area under the normal curve?
7. What are independent variables?
8. What does a set of mutually exclusive and collectively exhaustive set of events constitute?
9. Let X be a continuous random variable, with the pdf given as below

$$
\begin{aligned}
f(x) &= ax, && 0 <= x <= 1,\\
&= a, && 1 <= x <= 2,\\
&= -ax+3a, && 2 <= x <= 3,\\
&= 0 && \text{elsewhere}
\end{aligned}
$$

Determine the value of a.

10. State Baye's theorem

11. Evaluate the following.

(a) $\int_{-\infty}^{\infty} e^{-\frac{(x-\mu)^2}{2\sigma^2}} dx$

(b) $\int_{0}^{\infty} \alpha e^{-\alpha x} dx$