1- Let $Y = A \cos(\omega t) + c$, where $A$ has mean $m$ and variance $\sigma^2$, and $\omega$ and $c$ are constants. Find the mean and variance of $Y$.

2- 
   a. Suppose a coin is tossed $n$ times. Each coin toss costs $d$ dollars and the reward in obtaining $X$ heads is $aX^2 + bX$. Find the expected value of the net reward.
   b. Suppose that the reward in obtaining $X$ heads is $a^X$, where $a>0$. Find the expected value of the reward.

3- Let $g(X) = b \ a^X$, where $a$ and $b$ are positive constants and $X$ is a poisson random variable. Find $E[g(X)]$.

4- Find the mean and variance of the limiter shown below
5- Let the random variables X, Y, and Z be independent continuous random variables. Find the following probabilities in terms of F(x), F(y) and F(z)
   a. \( P[ |X| < 5, Y > 2, Z^2 \geq 2 ] \)
   b. \( P[ X > 5, Y < 0, Z = 1] \)
   c. \( P[ \min(X,Y,Z) > 2 ] \)
   d. \( P[ \max(X,Y,Z) < 6] \)

6- The random vector (X, Y) is uniformly distributed (i.e. \( f(xy) = k \)) inside the regions shown below and zero elsewhere.
   a. Find the value of K in each case
   b. Find the marginal pdf for X and Y in each case.
   c. Are X and Y independent?