1. Let the p.d.f of $X$ be $f(x) = \begin{cases} \frac{x+2}{4}, & -2 < x < 0 \\ \frac{1}{2}, & 0 \leq x < 1 \end{cases}$.
   
   (a) Find the cumulative density function (c.d.f).
   (b) Sketch the graphs of the p.d.f and the c.d.f.
   (c) Find $E(X)$.

2. Let $X$ be a random variable with a uniform distribution on the interval $(a, 6)$. If $E(X) = 6Var(X)$, then find
   
   (a) $a$.
   (b) $P\left(X + \frac{20}{X} > 9\right)$.

3. Let $f(x) = \lambda e^{-\lambda x}$, $x \geq 0$, $\lambda > 0$.
   
   (a) Find the median $M$.
   (b) Evaluate the integral $E\left(X^2\right) = \int_{x=0}^{\infty} x^2 f(x) \, dx$. (Your answer will be in terms of $\lambda$.)
   (c) If the $M = \ln(4)$, then find $\lambda$ without using a calculator.

4. If $X \sim N(650, 25^2)$, then find
   
   (a) $P(620 < X < 700)$.
   (b) $P\left(\left|x - 650\right| > 25.0\right)$.
   (c) a constant $c$ such that $P\left(\left|x - 650\right| < c\right) = 0.8664$.
   
   Draw graphs and shade the areas of interest.

5. If $X \sim Uni(0, 1)$, then find
   
   (a) the p.d.f. of $Y = \sqrt{X}$.
   (b) the p.d.f. of $Y = X^2$. 