

MATH 16B - WORKSHEET 10

1

i Define expected value, variance and standard deviation for discrete random variables.

ii Given a continuous random variable X , define the probability density function (p.d.f.) and the cumulative distribution function (c.d.f.).

2 Consider a 8-sided die with the numbers $\{1, 2, 3, 4, 5, 5, 6, 7\}$ appearing on the faces (one number on each face). You may assume that after each roll, all faces are equally likely to be on top; the number on the top face is defined to be the value of the roll.

i Compute the expected value and variance of one roll.

ii Roll the die twice and let S be the sum of the values of each roll. Compute the expected value, variance and standard deviation of S .

3 Let X be a random variable with outcomes in $[A, B]$ and p.d.f. $x \cos x$. Find a possible pair (A, B) .

4 Let X be a random variable with outcomes in $(-\infty, \infty)$ and p.d.f. $f(x) = \begin{cases} cxe^{-\frac{x}{3}} & \text{if } x \geq 0 \\ 0 & \text{else} \end{cases}$ for some constant c .

i Compute the value of c .

ii Compute $\Pr(X \geq 3)$ and $\Pr(-1 \leq X \leq 1)$.

iii Find a value b such that $\Pr(X \leq b) \sim 0.2$ (\sim means approximately; find the exact value of b isn't easy).

iv Compute $E(X)$ and $\text{Var}(X)$.

5 Let X be a random variable with outcomes in $[0, 1]$ and probability density function $f(x) = c + dx^2$. If $E(X) = \frac{2}{3}$ find c and d .