

Probability: Quiz Three, March 31, 2026

Name/ID: _____

- 1) (35%) X is a random variable with the probability mass function (PMF) p_X as

$$p_X(x) = \begin{cases} \frac{1}{7}, & x \in \mathbb{Z} \text{ and } x \in [-2, 4] \\ 0, & \text{otherwise.} \end{cases}$$

Answer the following questions.

- Find the PMF, mean, and variance of $Y = |X - 1|$.
- Find the mean and variance of $Z = -4|X - 1| - 6$

- 2) (15%) We roll two biased 4-sided dice and write down the probabilities of ordered pairs of rolls (x, y) in Fig. 1. Calculate the PMF p_Z of the random variable $Z =$ “minimum roll of the ordered pair”.

y					
	4	$\frac{1}{18}$	$\frac{1}{36}$	$\frac{1}{36}$	$\frac{1}{18}$
	3	$\frac{1}{18}$	$\frac{1}{36}$	$\frac{1}{36}$	$\frac{1}{18}$
	2	$\frac{1}{6}$	$\frac{1}{12}$	$\frac{1}{12}$	$\frac{1}{6}$
	1	$\frac{1}{18}$	$\frac{1}{36}$	$\frac{1}{36}$	$\frac{1}{18}$
		1	2	3	4 x

Fig. 1. Problem 2

3) (20%)

- a) Given a *Bernoulli random variable* with parameter $1/2$,
its mean = _____ and variance = _____.
- b) Given a *Binomial random variable* with parameters n and $1/2$, its mean = _____.

4) (30%)

- a) What is the definition of “**Discrete random variable**”?
- b) What is the mean of the *Poisson random variable* with parameter $1/2$?
- c) What is the mean of the *Geometric random variable* with parameter $1/2$?