MATH1550, Winter 2023 **Names:**
Seminar 9

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1. Let X and Y be a discrete random variables with distributions

$$f(x) = \begin{cases} \frac{1}{3} & x = -1, 0, 1 \\ 0 & \text{otherwise} \end{cases} \qquad g(y) = \begin{cases} \frac{1}{3} & y = -2, 0, 2 \\ 0 & \text{otherwise} \end{cases},$$

respectively.

   (a) Find the mean and variance for X.

   (b) Find the mean and variance for Y.

2. Let random variable X be sum of two regular six sided dice. Find the mean and variable of X.

3. Let X be a continuous random variable with probability density

$$f(x) = \begin{cases} 2x & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}.$$

   (a) Find the mean of X.

   (b) Find the variance of X.

   (c) Find the third moment about the mean of X.

4. In a certain manufacturing process, the (Fahrenheit) temperature never varies by more than $2°$ from $62°$. The temperature is a random variable F with distribution

x	60	61	62	63	64
$P(F = x)$	1/10	2/10	4/10	2/10	1/10

   (a) Find the mean of and variance of F.

   (b) To convert to the measurements to degrees Celsius we let $C = \frac{5}{9}(F - 32)$. Find the mean and variance of C.

5. Suppose X is a continuous random variable with probability density

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

for all $x \in \mathbb{R}$. It can be shown that X has moment generating function

$$M_X(t) = e^{\frac{t^2}{2}}.$$

Find the mean and variance of X.