Question 1 — 4 pts

How many ways are there to arrange the following letters

$HHHHTTT$?

Assume that H's are indistinguishable and T's are indistinguishable.

Question 2 — 4 pts

Let X be a random variable that takes values 6, 11, and 14 with $P(X = 11) = 0.5$ and $P(X = 14) = 0.2$.

Find $E[X]$.

Question 3

4 pts

A fair die is rolled 120 times. Find the expected number of times we will observe outcome "6."

Hint: If $X \sim \text{Binomial}(n, p)$ with some $n \in \{1, 2, 3, \ldots\}$ and $p \in [0, 1]$, then $E[X] = np$.

Question 4

4 pts

Let X be a continuous random variable with the following probability density function:

$f_X(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$ for all $x \in \mathbb{R}$.

Find $E[X]$.

Question 5

4 pts

Let X be a continuous random variable with the following probability density function:

$$f_X(x) = \begin{cases} e^{-x}, & \text{if } x \geq 0, \\ 0, & \text{if } x < 0. \end{cases}$$

Find $E[X]$.