1. [10 points] Suppose that the continuous random variable $X$ has a density

$$f_X(t) \overset{\text{def}}{=} \begin{cases} t & \text{if } 0 \leq t \leq 1 \\ 2 - t & \text{if } 1 < t \leq 2. \end{cases}$$

Compute

$$\mathbb{P}\left\{ \frac{1}{2} \leq X \leq \frac{3}{2} \right\}.$$
1. 
\[
P \left\{ \frac{1}{2} \leq X \leq \frac{3}{2} \right\} = \int_{1/2}^{3/2} f_X(s)ds = \int_{1/2}^{1} sds + \int_{1}^{3/2} (2 - s)ds \\
= 2 \int_{1/2}^{1} sds = s^2 \bigg|_{s=1/2}^{1} = 1 - \frac{1}{4} = \frac{3}{4}.
\]