Show **all** of your work on this assignment and answer each question fully in the given context.

Please staple your assignment!!

1. Create the following Venn Diagram by labelling the values in each section

   - 150 people at a Iowa State Band concert were asked if they knew how to play piano, drums or guitar.
   - 18 people could play none of these instruments.
   - 10 people could play all three of these instruments.
   - 77 people could play drums or guitar but could not play piano.
   - 73 people could play guitar.
   - 49 people could play at least two of these instruments.
   - 13 people could play piano and guitar but could not play drums.
   - 21 people could play piano and drums.

2. Let X be a random variable with the probability function given by

$$f(x) = \frac{3^x e^{-3}}{x!}$$

for $x = 0, 1, 2, 3, \ldots$ and 0 otherwise. Find the expected value of X and plot the probability function.

Since $\sum_{i=0}^{\infty} \frac{3^x e^{-3}}{x!} = 1$ (because it is the sum of all the probabilities and the total probability is 1).

$$\begin{aligned}
E(X) &= \sum_{x=0}^{\infty} x f(x) \\
&= \sum_{x=0}^{\infty} x \frac{3^x e^{-3}}{x!} \\
&= \sum_{x=1}^{\infty} x \frac{3^x e^{-3}}{x!} \\
&= \sum_{x=1}^{\infty} \frac{3^x e^{-3}}{(x-1)!}
\end{aligned}$$

2. Let X be a random variable with the probability function given by

$$f(x) = (.3)^x \cdot (.7)^{1-x}$$

for $x = 0, 1$ and 0 otherwise. Find the expected value and variance of X.