1. The random variables $X_1, X_2$ and $X_3$ are independent $N(\mu, 1)$. Let $\bar{X}$ be the (arithmetic) average of the three random variables. What is the probability that $X_1 - \bar{X} > 1.6$?

2. A factory produces door hinges for wholesale. Every hinge, independently of all other, is defective with probability 0.005. The hinges are packed (without control) in boxes of 100.
   (a) A box is considered bad if it contains more than three defective hinges. What is the probability that a box is bad?
   (b) In a shipment with 10,000 boxes, what is the probability that there are more than 25 bad boxes?

3. A company produces jam in cardboard containers. An empty box weighs 1.5 ounces. They fill a container by putting it on a scale and filling in jam until the scale shows the value $m$. Then the actual amount of jam in the container is $Y$ ounces. The scale has a measurement error $X$, which has a normal distribution with mean 0 and standard deviation 0.25 ounces.
   (a) What is the relation between $X$, $Y$ and $m$?
   (b) What is the distribution of $Y$?
   (c) How should you choose $m$ if you want that 95% of the containers should contain at least 16 ounces of jam?

4. It is estimated that 80% of all St Bernard dogs have weights between 134.4 and 185.6 pounds. Assuming that the weight distribution can be described by a normal distribution and assuming that 134.4 and 185.6 are equally far from the mean, determine the standard deviation of the weight distribution.