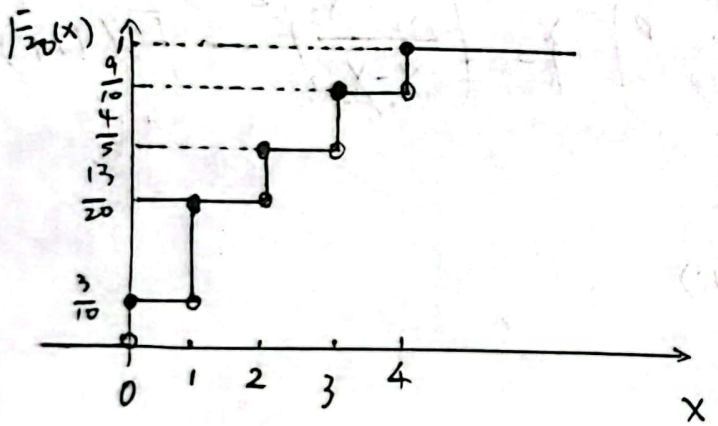
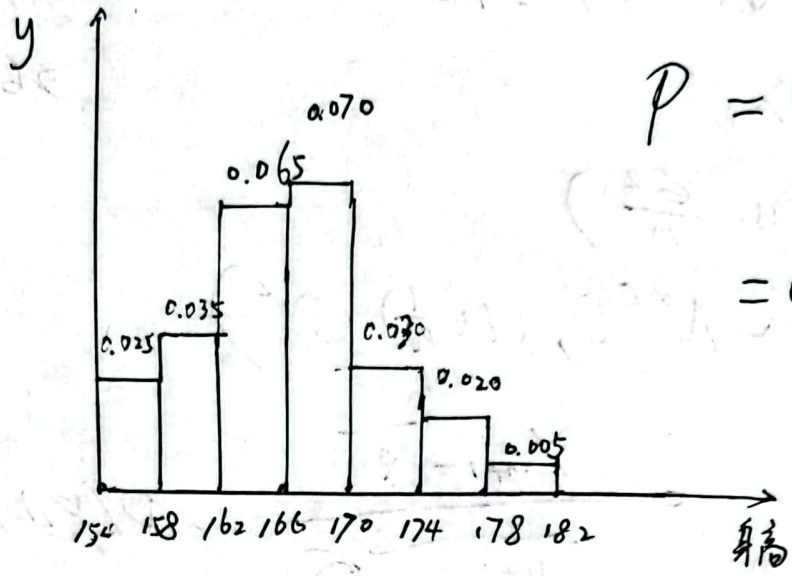
5.

损坏件数 x	0	1	2	3	4
频数	6	7	3	2	2
频率	$\frac{3}{10}$	$\frac{7}{20}$	$\frac{3}{20}$	$\frac{1}{10}$	$\frac{1}{10}$

$$F_{20}(x)=\begin{cases}0 & x<0\\ \frac{3}{10} & 0\le x<1\\ \frac{13}{20} & 1\le x<2\\ \frac{4}{5} & 2\le x<3\\ \frac{9}{10} & 3\le x<4\\ 1 & 4\le x\end{cases}$$



6.



17. $Y=\frac{1}{\sigma^2}\sum_{i=1}^{n}(X_i-\mu)^2=\sum_{i=1}^{n}\left(\frac{X_i-\mu}{\sigma}\right)^2$

由于 $(X_1,X_2,\cdots,X_n)$ 是来自正态总体 $N(\mu,\sigma^2)$ 的样本，则 $\frac{X_i-\mu}{\sigma}\sim N(0,1)$ $(i=1,2,3,\cdots n)$

则 $\left(\frac{X_i-\mu}{\sigma}\right)^2\sim\chi^2(1)$

则 $Y=\sum_{i=1}^{n}\left(\frac{X_i-\mu}{\sigma}\right)^2\sim\chi^2(n)$

23. $(X_1, X_2, \cdots, X_n, X_{n+1})$ 是来自正态总体 $N(\mu, \sigma^2)$ 的样本.

$\overline{X} = \frac{1}{n}\sum_{i=1}^{n} X_i$.

则 $\overline{X} \sim N(\mu, \frac{\sigma^2}{n})$

则 $X_{n+1} - \overline{X} \sim N(0, (1+\frac{1}{n})\sigma^2)$

$$\Rightarrow \frac{X_{n+1}-\overline{X}}{\sqrt{(1+\frac{1}{n})\sigma^2}} = \frac{X_{n+1}-\overline{X}}{\sqrt{\frac{n+1}{n}}\sigma} \sim N(0,1)$$

由 $S^2 = \frac{1}{n-1}\sum_{i=1}^{n}(X_i - \overline{X})^2$

$$\Rightarrow \frac{(n-1)S^2}{\sigma^2} = \sum_{i=1}^{n}\left(\frac{X_i-\overline{X}}{\sigma}\right)^2 \sim \chi^2(n-1)$$

则 $Y = \dfrac{X_{n+1}-\overline{X}}{\sqrt{\frac{n+1}{n}}\sigma} \Big/ \sqrt{\dfrac{(n-1)S^2}{\sigma^2}/(n-1)} \sim t(n-1)$

则 $Y \sim t(n-1)$.

26. (X_1, X_2) 是来自总体 $X \sim N(0, \sigma^2)$ 样本

则 $X_1 + X_2 \sim N(0, 2\sigma^2)$

$X_1 - X_2 \sim N(0, 2\sigma^2)$

则 $\dfrac{X_1+X_2-0}{\sqrt{2}\sigma} \sim N(0,1)$

则 $\left(\dfrac{X_1+X_2}{\sqrt{2}\sigma}\right)^2 \sim \chi^2(1)$

$\left(\dfrac{X_1-X_2}{\sqrt{2}\sigma}\right)^2 \sim \chi^2(1)$

则 $Y = \left(\dfrac{X_1+X_2}{X_1-X_2}\right)^2 \sim F(1,1)$