2008研究生数理统计试题参考答案

一。填空（57分）
1. 52cm;
2.$\rho\sigma_1\sigma_2$
3. 5
4. 11
5;$F(n,1)$
6. 1;0.5
7. 150;300
8.$F(s-1,n-s)$;拒绝
9. 82;168
10.$b(100,0.8)$;0.9938
11.$\chi^2(2)$;$t(2)$
12.$F(8,9)$;0.25

二.(43分)
1.(10分)
(1)由$E(\hat{\theta}_1)=E(\hat{\theta}_2)=\theta$可得a=2;b=(n+1)/n;
(2)$D(\hat{\theta}_1)=\theta^2/(3n)>D(\hat{\theta}_2)=\theta^2/(n(n+2))$, $\hat{\theta}_2$较$\hat{\theta}_1$有效
2.(10分)
$H_0:p_i=1/6,(i=1,\cdots,6)$
H_0为真时,$\chi^2=\sum_{i=1}^{6}\frac{(f_i-np_i)^2}{np_i}\overset{approx}{\sim}\chi^2(5)$,经计算得$\chi^2=11.5>\chi^2_{0.05}(5)=11.071$; 拒绝$H_0$
3.(10分)
(1)$s_1^2=s_2^2\hat{=}s^2=30/4, F_{0.05}(8,8)=3.44, F_{0.95}(8,8)=1/3.44,$
$F_{0.95}(8,8)<s_1^2/s_2^2=1<F_{0.05}(8,8)$,接受$H_0$
(2)$\bar{x}=35,\bar{y}=20,s=\sqrt{30}/2;$
H_0为真时$t=(\overline{X}-2\overline{Y})/[\sqrt{(1/n_1+4/n_2)}\sqrt{\frac{(n_1-1)S_1^2+(n_2-1)S_2^2}{n_1+n_2-2}}]\sim t(n_1+n_2-2)$
计算得$t=(\bar{x}-2\bar{y})/[s\sqrt{(1/9+4/9)}]=-2.4495<-t_{0.1}(16)=-1.3368$,拒绝$H_0$
4.(13分)
$\bar{x}=3,\bar{y}=11,s_{xx}=10,s_{xy}=36,s_{yy}=130$
(1)$\hat{y}=0.2+3.6x$
(2)$Q_e=0.4;\hat{\sigma}^2=0.4/3,t=|\hat{b}|\sqrt{s_{xx}}/\hat{\sigma}=31.1769>t_{0.025}(3)=3.1824$,拒绝$H_0$
(3)$(\hat{b}\mp t_{0.025}(3)\hat{\sigma}/\sqrt{s_{xx}})=(3.2325,3.9675)$