(a) $E(\tilde{\tau}_1-\tilde{\tau}_2)=E(\tilde{\tau}_1)-E(\tilde{\tau}_2)=\tau_1-\tau_2$ (unbiased)

$Var(\tilde{\tau}_1-\tilde{\tau}_2)=Var(\bar{Y}_{1+}-\bar{Y}_{++}-\bar{Y}_{2+}+\bar{Y}_{++})$

$=Var(\bar{Y}_{1+}-\bar{Y}_{2+})$

$=Var(\bar{Y}_{1+})+Var(\bar{Y}_{2+})$

$=\frac{1}{5}\sigma^2+\frac{1}{5}\sigma^2$

$=\frac{2}{5}\sigma^2$

$H_0: \tau_1-\tau_2=0 \quad H_a: \tau_1-\tau_2\neq 0$

$d=\frac{\hat{\tau}_1-\hat{\tau}_2-0}{\hat{\sigma}\sqrt{\frac{2}{5}}}=\frac{\frac{353}{5}-\frac{357}{5}}{1.049\sqrt{\frac{2}{5}}}=-1.206 \qquad D\sim t_{10-5-2-1+2}=t_4$

p-value $=P(D\geq|d|)=2(1-P(D<d))=0.294$

We have no evidence reject H_0. Hence there is no difference between the effects of treatments.

(b) $a=\#$ of blocks $-1=4$

$b=\#$ of trts $-1=1$

$c=n-q+C=10-5-2-1+2=4$

$d=a+b+c=4+1+4=9$

$e=SS_{TOT}-SS_{blk}-SS_{trt}=76-70-1.6=4.4$

$f=\frac{SS_{blk}}{df_{blk}}=\frac{70}{4}=17.5$

$g=\frac{MS_{trt}}{MS_{res}}=\frac{1.6}{1.1}=1.4545$

$h=P(F>15.9091)=1-P(F\leq 15.9091)=0.01008$

(c) Since the p-value of $\tau_1-\tau_2=0$ is large, we have no evidence against H_0 which is there is no difference between the effects of the treatment. Hence

(d) $H_0: \tau_1=\tau_2=\tau_3=\beta_1=\cdots=\beta_6=0 \qquad H_a$: at least one of them are not 0.

$f=\frac{\frac{SS_{blk}+SS_{trt}}{7}}{MS_{res}}=\frac{\frac{80.4+11.6}{7}}{\frac{21.2}{11}}=6.819, \quad F\sim F_{7,11}$

p-value $=P(F>f)=1-P(F<f)=0.00273$ from r $1-pt(6.819,7,11)$

There is tons of evidence reject H_0. Not all averages across the rows and colomns are the same.