Table 9B, Table 10B and Table 11B:

```
##############################
## Variable Set Up      #####
##############################
#################################################################
hsig_list=c(0,0.125,0.25,0.5,1.0,2.0,4.0);
nj_list=c(20, 80);
al1_list=c(0, 1);
Simn=10000;

ind=1;
Bias=50;
simnum=10000;
#################################################################



#################################################################
# Import 'metafor' Package and set seed
#################################################################
set.seed(7);
library(tcltk)
library(metafor)


#################################################################
# Generating data for primary data
#################################################################
dgp <-function(al1, sigh,ind){
  #DGP: refer to step 1 in page 25;
  obs=sample(c(62,125,250,500,1000),1);
  x1=runif(obs, min = 100, max = 200);
  x2=x1+rnorm(obs, mean = 0, sd = 50);
  x3=x1+rnorm(obs, mean = 0, sd = 50);
  if (ind==0){
    z = 100 + al1*x1 + 0.5*x2 + rnorm(1,mean=0,sd=sigh)*x3+rnorm(obs,mean=0,sd=100);
  } else if (ind==1) {
    z = 100 + (al1+rnorm(1,mean=0,sd=sigh))*x1 + 0.5*x2 + rnorm(obs,mean=0,sd=100);
  }
  return (as.data.frame(cbind(z, x1 ,x2)))
}
```

```r
#################################################################
# Generating data for MRA study
#################################################################
dtcollection <- function(al1, sigh, ssize, Bias,ind){
  output =  matrix(0, nrow=ssize, ncol=5);
  colnames(output) <- c("id","y","al_se","mj","Significant");

  num_publ=ssize*(Bias/100);
  for(i in 1:ssize) {
    output[i,1]=i;
    if (i<=num_publ){
      while (output[i,5]==0){
        data=dgp(al1,sigh,ind);
        model_selection=sample(c(1.1, 1.2),1);
        if (model_selection==1.1) {
          out <- lm(data[,1] ~ data[,2] + data[,3]);
          output[i,4]=0;
        } else if (model_selection==1.2){
          out <- lm(data[,1] ~ data[,2])
          output[i,4]=1;
        } else { cat("Model Selection Error", "\n"); }
        output[i,2]=coefficients(out)[2];
        output[i,3]=sqrt(diag(vcov(out)))[2];
        output[i,5]=((summary(out)$coefficients[2,4]<=0.05)*(0<=summary(out)$coefficients
            [2,1]));
      }
    } else if (i>num_publ){
      data=dgp(al1,sigh,ind);
      model_selection=sample(c(1.1, 1.2),1);
      if (model_selection==1.1) {
        out <- lm(data[,1] ~ data[,2] + data[,3])
        output[i,4]=0;
      } else if (model_selection==1.2){
        out <- lm(data[,1] ~ data[,2]);
        output[i,4]=1;
      } else { cat("Model Selection Error", "\n"); }
      output[i,2]=coefficients(out)[2];
      output[i,3]=sqrt(diag(vcov(out)))[2];
      output[i,5]=((summary(out)$coefficients[2,4]<=0.05)*(0<summary(out)$coefficients[2,1])
          );
    } else { cat("Publication Bias Error", "\n"); }
  }
  return(output)
}
#################################################################
```

```
88  ##################################################################
89  # Simulation Begins
90  ##################################################################
91  mdl=y~al_se+mj;
92  mdl2=y~al_se2+mj;
93
94
95
96  nrow=length(hsig_list)*length(nj_list)*length(al1_list)
97  output_zero  =  matrix(0, nrow=nrow, ncol=13);
98  colnames(output_zero) <- c("MRA_Size","h_sigma","TrueEffect","FE-ERR(B0)","RE-ERR(B0)","WLS-
        ERR(B0)","I2","FE-E[B0]","RE-E[B0]","WLS-E[B0]","FE-sig(B0)","RE-sig(B0)", "WLS-sig(B0)"
        );
99  output_one  =  matrix(0, nrow=nrow, ncol=13);
100 colnames(output_one) <- c("MRA_Size","h_sigma","TrueEffect","FE-ERR(B1)","RE-ERR(B1)","WLS-
        ERR(B1)","I2","FE-E[B1]","RE-E[B1]","WLS-E[B1]","FE-sig(B1)","RE-sig(B1)", "WLS-sig(B1)"
        );
101 output_two  =  matrix(0, nrow=nrow, ncol=13);
102 colnames(output_two) <- c("MRA_Size","h_sigma","TrueEffect","FE-ERR(B2)","RE-ERR(B2)","WLS-
        ERR(B2)","I2","FE-E[B1]","RE-E[B2]","WLS-E[B2]","FE-sig(B2)","RE-sig(B2)", "WLS-sig(B2)"
        );
103
104 cnt=1;
105 start.time <- Sys.time()
106
107
108 for (k in al1_list){ al1=k;
109 for (j in nj_list) { nj=j;
110 for (l in hsig_list){
111   hsig=l;
112   output_b0 =  matrix(0, nrow=Simn, ncol=7);
113   colnames(output_b0) <- c("FE-MRA","RE_MRA","WLS-MRA", "I2","FE_Coeff","RE_Coeff","WLS_
          Coeff");
114   output_b1 =  matrix(0, nrow=Simn, ncol=7);
115   colnames(output_b1) <- c("FE-MRA","RE_MRA","WLS-MRA", "I2","FE_Coeff","RE_Coeff","WLS_
          Coeff");
116   output_b2 =  matrix(0, nrow=Simn, ncol=7);
117   colnames(output_b2) <- c("FE-MRA","RE_MRA","WLS-MRA", "I2","FE_Coeff","RE_Coeff","WLS_
          Coeff");
118   cat("Preparing row", cnt, "/", nrow, "\n");
119
120
121
122
123
```

```
124
125   pc=0;
126   for(i in 1:Simn) {
127     flag=TRUE
128     while (flag==TRUE){
129       flag=FALSE
130       MRAdata=as.data.frame(dtcollection(al1, hsig, nj, Bias, ind));
131       al_se2=MRAdata$al_se*MRAdata$al_se;
132       test=try(rma.uni(mdl,vi=al_se*al_se, intercept=TRUE, data=MRAdata, weighted=TRUE,
              method="REML", level=95, digits=5), silent =TRUE)
133       if(summary(test)[2]=="try-error") {flag=TRUE; }
134       if(flag==FALSE) { if(is.numeric(test$R2)==FALSE) {flag=TRUE;}}
135
136       test=try(rma.uni(mdl2,vi=al_se*al_se, intercept=TRUE, data=MRAdata, weighted=TRUE,
              method="REML", level=95, digits=5), silent =TRUE)
137       if(summary(test)[2]=="try-error") {flag=TRUE; }
138       if(flag==FALSE) { if(is.numeric(test$R2)==FALSE) {flag=TRUE;}}
139     }
140
141     reg_fe=rma.uni(mdl,vi=al_se*al_se, intercept=TRUE, data=MRAdata, weighted=TRUE, method="
          FE", level=95, digits=5)
142     output_b0[i,1]=(0==(reg_fe$ci.lb[1]<al1)*(al1<reg_fe$ci.ub[1]))
143     output_b1[i,1]=(0==(reg_fe$ci.lb[2]<0)*(0<reg_fe$ci.ub[2]))
144     output_b2[i,1]=(0==(reg_fe$ci.lb[3]<0)*(0<reg_fe$ci.ub[3]))
145     output_b0[i,5]=(coefficients(reg_fe)[1]);
146     output_b1[i,5]=(coefficients(reg_fe)[2]);
147     output_b2[i,5]=(coefficients(reg_fe)[3]);
148
149     if ((0==(reg_fe$ci.lb[1]<0)*(0<reg_fe$ci.ub[1]))){
150       reg_fe=rma.uni(mdl2,vi=al_se*al_se, intercept=TRUE, data=MRAdata, weighted=TRUE,
            method="FE", level=95, digits=5)
151       output_b0[i,1]=(0==(reg_fe$ci.lb[1]<al1)*(al1<reg_fe$ci.ub[1]))
152       output_b1[i,1]=(0==(reg_fe$ci.lb[2]<0)*(0<reg_fe$ci.ub[2]))
153       output_b2[i,1]=(0==(reg_fe$ci.lb[3]<0)*(0<reg_fe$ci.ub[3]))
154       output_b0[i,5]=(coefficients(reg_fe)[1]);
155       output_b1[i,5]=(coefficients(reg_fe)[2]);
156       output_b2[i,5]=(coefficients(reg_fe)[3]);
157     }
158
159
160
161
162
163
164
```

```
    reg_re=rma.uni(mdl, vi=al_se*al_se, intercept=TRUE, data=MRAdata, weighted=TRUE, method="
        REML", level=95, digits=5)
    output_b0[i,2]=(0==(reg_re$ci.lb[1]<al1)*(al1<reg_re$ci.ub[1]))
    output_b0[i,6]=(coefficients(reg_re)[1]);
    output_b1[i,2]=(0==(reg_re$ci.lb[2]<0)*(0<reg_re$ci.ub[2]))
    output_b1[i,6]=(coefficients(reg_re)[2]);
    output_b2[i,2]=(0==(reg_re$ci.lb[3]<0)*(0<reg_re$ci.ub[3]))
    output_b2[i,6]=(coefficients(reg_re)[3]);


    if ((0==(reg_re$ci.lb[1]<0)*(0<reg_re$ci.ub[1]))){
        reg_re=rma.uni(mdl2, vi=al_se*al_se, intercept=TRUE, data=MRAdata, weighted=TRUE,
            method="REML", level=95, digits=5)
        output_b0[i,2]=(0==(reg_re$ci.lb[1]<al1)*(al1<reg_re$ci.ub[1]))
        output_b0[i,6]=(coefficients(reg_re)[1]);
        output_b1[i,2]=(0==(reg_re$ci.lb[2]<0)*(0<reg_re$ci.ub[2]))
        output_b1[i,6]=(coefficients(reg_re)[2]);
        output_b2[i,2]=(0==(reg_re$ci.lb[3]<0)*(0<reg_re$ci.ub[3]))
        output_b2[i,6]=(coefficients(reg_re)[3]);
    }

    reg_wls=lm (mdl, data=MRAdata,weights=(1/(al_se*al_se)))
    output_b0[i,3]=(0==(confint(reg_wls)[1,1]<al1)*(al1<confint(reg_wls)[1,2]))
    output_b0[i,7]=(coefficients(reg_wls)[1]);
    output_b1[i,3]=(0==(confint(reg_wls)[2,1]<0)*(0<confint(reg_wls)[2,2]))
    output_b1[i,7]=(coefficients(reg_wls)[2]);
    output_b2[i,3]=(0==(confint(reg_wls)[3,1]<0)*(0<confint(reg_wls)[3,2]))
    output_b2[i,7]=(coefficients(reg_wls)[3]);

    if ((0==(confint(reg_wls)[1,1]<0)*(0<confint(reg_wls)[1,2]))){
        reg_wls=lm (mdl2, data=MRAdata,weights=(1/(al_se*al_se)))
        output_b0[i,3]=(0==(confint(reg_wls)[1,1]<al1)*(al1<confint(reg_wls)[1,2]))
        output_b0[i,7]=(coefficients(reg_wls)[1]);
        output_b1[i,3]=(0==(confint(reg_wls)[2,1]<0)*(0<confint(reg_wls)[2,2]))
        output_b1[i,7]=(coefficients(reg_wls)[2]);
        output_b2[i,3]=(0==(confint(reg_wls)[3,1]<0)*(0<confint(reg_wls)[3,2]))
        output_b2[i,7]=(coefficients(reg_wls)[3]);
    }

    output_b0[i,4]=reg_re$I2;
    output_b1[i,4]=reg_re$I2;
    output_b2[i,4]=reg_re$I2;
    pc=pc+1;
    if((i-1)%%(Simn/10)==0){cat(10*(i-1)/(Simn/10), ".. ") }
}
```

```
208    output_zero[cnt,]=c(nj, hsig, al1, mean(output_b0[,1]), mean(output_b0[,2]), mean(output_
           b0[,3]), mean(output_b0[,4])/100, mean(output_b0[,5]), mean(output_b0[,6]), mean(
           output_b0[,7]),mean((output_b0[,5]-al1)^2), mean((output_b0[,6]-al1)^2), mean((output_
           b0[,7]-al1)^2))
209    output_one[cnt,]=c(nj, hsig, al1, mean(output_b1[,1]), mean(output_b1[,2]), mean(output_b1
           [,3]), mean(output_b1[,4])/100, mean(output_b1[,5]), mean(output_b1[,6]), mean(output_
           b1[,7]),sqrt(var(output_b1[,5])), sqrt(var(output_b1[,6])), sqrt(var(output_b1[,7])))
210    output_two[cnt,]=c(nj, hsig, al1, mean(output_b2[,1]), mean(output_b2[,2]), mean(output_b2
           [,3]), mean(output_b2[,4])/100, mean(output_b2[,5]), mean(output_b2[,6]), mean(output_
           b2[,7]),sqrt(var(output_b2[,5])), sqrt(var(output_b2[,6])), sqrt(var(output_b2[,7])))
211    cat("Done!", "\n");
212    cnt=cnt+1;
213 }}}
214
215 ##################################################################
216 ##################################################################
217 ##################################################################
218
219 end.time <- Sys.time()
220 time.taken <- end.time - start.time
221 time.taken
222
223
224 round(output_zero, 6)
225 round(output_one, 6)
226 round(output_two, 6)
```