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/* ***** */
/* beachwelf.g */
/* does the compensating variations for the nested logit model */
/* with a participation decision. */
/* set up to use estimation output from beachrec.g */
/* and data set bchwelfdata.asc */
/* [M. Massey 2002] */
/* ***** */

new , 20000;
cls;

/* ***** */
/* load data and coefficients */
/* ***** */

/* LOADS DATA SET XMAT - CONTAINS CHARACTERISTICS */
load xmat[565,1005]= C:\_____ \bchwelfdata.asc;

/* LOADS ESTIMATED COEFFICIENTS */
load bmod1[1,29] = C:\_____ \nlbetacoef.txt;

output file = C:\_____ \welfare.txt reset;
print" output sent to welfare.txt ";

/* VISUALLY CHECK COEFFICIENTS READ IN CORRECTLY */
print; print;
print "Nested Logit Model Coefficient Estimates";
print "b1 Price " bmod1[1,1];
print "b2 Log length " bmod1[1,2];
print "b3 Boardwalk " bmod1[1,3];
print "b4 Amusements " bmod1[1,4];
print "b5 Private " bmod1[1,5];
print "b6 Park " bmod1[1,6];
print "b7 Wide " bmod1[1,7];
print "b8 Narrow " bmod1[1,8];
print "b9 Atl. City " bmod1[1,9];
print "b10 Surfing " bmod1[1,10];
print "b11 High Rise " bmod1[1,11];
print "b12 Park Within " bmod1[1,12];
print "b13 Facilities " bmod1[1,13];
print "b14 Parking " bmod1[1,14];
print "b15 IVnj " bmod1[1,15];
print "b16 IVde " bmod1[1,16];
print "b17 IV2 " bmod1[1,17];
print "b18 constant " bmod1[1,18];
print "b19 lnage " bmod1[1,19];
print "b20 kidsul0 " bmod1[1,20];
print "b21 kidsul6 " bmod1[1,21];
print "b22 flexm " bmod1[1,22];
print "b23 vpin " bmod1[1,23];
print "b24 vpout " bmod1[1,24];
print "b25 retired " bmod1[1,25];
print "b26 student " bmod1[1,26];
print "b27 parttime " bmod1[1,27];
print "b28 workhome " bmod1[1,28];
print "b29 volunt " bmod1[1,29];

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print; print;

/* ***** */
/*   ASSIGN NAMES TO COMPONENTS OF XMAT   */
/* ***** */

    price=xmat[.,1:62];
    length=xmat[.,63:124];
    bwalk=xmat[.,125:186];
    amuse=xmat[.,187:248];
    priv=xmat[.,249:310];
    park=xmat[.,311:372];
    wide=xmat[.,373:434];
    narrow=xmat[.,435:496];
    acity=xmat[.,497:558];
    surf=xmat[.,559:620];
    hrise=xmat[.,621:682];
    parkwi=xmat[.,683:744];
    facil=xmat[.,745:806];
    parkng=xmat[.,807:868];
    nj=xmat[.,869:930];
    dayv=xmat[.,931:993];
    lnage=xmat[.,994];
    kidsul0=xmat[.,995];
    kidsul6=xmat[.,996];
    flextm=xmat[.,997];
    vpin=xmat[.,998];
    vpout=xmat[.,999];
    retired=xmat[.,1000];
    student=xmat[.,1001];
    parttime=xmat[.,1002];
    workhome=xmat[.,1003];
    volunt=xmat[.,1004];
    county=xmat[.,1005];

/* ***** */
/*   baseline expected utility levels   */
/* ***** */

    v=price.*bmod1[1,1] + length.*bmod1[1,2] + bwalk.*bmod1[1,3] +
        amuse.*bmod1[1,4] + priv.*bmod1[1,5] + park.*bmod1[1,6] +
        wide.*bmod1[1,7] + narrow.*bmod1[1,8] + acity.*bmod1[1,9] +
        surf.*bmod1[1,10] + hrise.*bmod1[1,11] + parkwi.*bmod1[1,12] +
        facil.*bmod1[1,13] + parkng.*bmod1[1,14];

    vng=bmod1[1,18] + lnage*bmod1[1,19] + kidsul0*bmod1[1,20] +
        kidsul6*bmod1[1,21] + flextm*bmod1[1,22] + vpin*bmod1[1,23] +
        vpout*bmod1[1,24] + retired*bmod1[1,25] + student*bmod1[1,26] +
        parttime*bmod1[1,27] + workhome*bmod1[1,28] + volunt*bmod1[1,29];

    e=exp(v);

    eng=exp(vng);

    enj=e[.,1:46];
    ede=e[.,47:62];

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inclusnj=enj^(bmod1[1,15]/bmod1[1,17]);
inclusde=ede^(bmod1[1,16]/bmod1[1,17]);

incluspt=(inclusnj~inclusde)^(bmod1[1,17]);

inclus=incluspt~eng;

d=sumc(inclus');

lndold=ln(d);

/* ***** */
/*           reduced beach width level utilities           */
/* ***** */

/* simulate changes in beach width */
widech1=zeros(565,5);
widech2=zeros(565,5);
widech3=zeros(565,1);

widchg1=wide[.,1:47]~widech1[.,1:5]~wide[.,53:62];
widchg2=wide[.,1:53]~widech2[.,1:5]~wide[.,59:62];
widchg3=wide[.,1:59]~widech3[.,1:1]~wide[.,61:62];
widchg4=wide[.,1:47]~widech1[.,1:5]~wide[.,53:59]~widech2[.,1:5]
~wide[.,59:59]~widech3[.,1:1]~wide[.,61:62];

narrch1=ones(565,5);
narrch2=ones(565,5);
narrch3=ones(565,1);

narchg1=narrow[.,1:47]~narrch1[.,1:5]~narrow[.,53:62];
narchg2=narrow[.,1:53]~narrch2[.,1:5]~narrow[.,59:62];
narchg3=narrow[.,1:59]~narrch3[.,1:1]~narrow[.,61:62];
narchg4=narrow[.,1:47]~narrch1[.,1:5]~narrow[.,53:59]~narrch2[.,1:5]
~narrow[.,59:59]~narrch3[.,1:1]~narrow[.,61:62];

/* narrow north shores to indian beach */
vn1=price.*bmod1[1,1] + length.*bmod1[1,2] + bwalk.*bmod1[1,3] +
amuse.*bmod1[1,4] + priv.*bmod1[1,5] + park.*bmod1[1,6] +
widchg1.*bmod1[1,7] + narchg1.*bmod1[1,8] + acity.*bmod1[1,9] +
surf.*bmod1[1,10] + hrise.*bmod1[1,11] + parkwi.*bmod1[1,12] +
facil.*bmod1[1,13] + parkng.*bmod1[1,14];

/* narrow north bethany to south bethany */
vn2=price.*bmod1[1,1] + length.*bmod1[1,2] + bwalk.*bmod1[1,3] +
amuse.*bmod1[1,4] + priv.*bmod1[1,5] + park.*bmod1[1,6] +
widchg2.*bmod1[1,7] + narchg2.*bmod1[1,8] + acity.*bmod1[1,9] +
surf.*bmod1[1,10] + hrise.*bmod1[1,11] + parkwi.*bmod1[1,12] +
facil.*bmod1[1,13] + parkng.*bmod1[1,14];

/* narrow fenwick island */
vn3=price.*bmod1[1,1] + length.*bmod1[1,2] + bwalk.*bmod1[1,3] +
amuse.*bmod1[1,4] + priv.*bmod1[1,5] + park.*bmod1[1,6] +
widchg3.*bmod1[1,7] + narchg3.*bmod1[1,8] + acity.*bmod1[1,9] +
surf.*bmod1[1,10] + hrise.*bmod1[1,11] + parkwi.*bmod1[1,12] +
facil.*bmod1[1,13] + parkng.*bmod1[1,14];

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/* narrow all developed beaches */
vn4=price.*bmod1[1,1] + length.*bmod1[1,2] + bwalk.*bmod1[1,3] +
amuse.*bmod1[1,4] + priv.*bmod1[1,5] + park.*bmod1[1,6] +
widchg4.*bmod1[1,7] + narchg4.*bmod1[1,8] + acity.*bmod1[1,9] +
surf.*bmod1[1,10] + hrise.*bmod1[1,11] + parkwi.*bmod1[1,12] +
facil.*bmod1[1,13] + parkng.*bmod1[1,14];

en1=exp(vn1);
en2=exp(vn2);
en3=exp(vn3);
en4=exp(vn4);

evnj1=en1[.,1:46];
evnj2=en2[.,1:46];
evnj3=en3[.,1:46];
evnj4=en4[.,1:46];

evde1=en1[.,47:62];
evde2=en2[.,47:62];
evde3=en3[.,47:62];
evde4=en4[.,47:62];

wcnj1=evnj1^(bmod1[1,15]/bmod1[1,17]);
wcnj2=evnj2^(bmod1[1,15]/bmod1[1,17]);
wcnj3=evnj3^(bmod1[1,15]/bmod1[1,17]);
wcnj4=evnj4^(bmod1[1,15]/bmod1[1,17]);

wcde1=evde1^(bmod1[1,16]/bmod1[1,17]);
wcde2=evde2^(bmod1[1,16]/bmod1[1,17]);
wcde3=evde3^(bmod1[1,16]/bmod1[1,17]);
wcde4=evde4^(bmod1[1,16]/bmod1[1,17]);

wcpt1=(wcnj1~wcde1)^bmod1[1,17];
wcpt2=(wcnj2~wcde2)^bmod1[1,17];
wcpt3=(wcnj3~wcde3)^bmod1[1,17];
wcpt4=(wcnj4~wcde4)^bmod1[1,17];

wcinc1=(wcpt1~eng);
wcinc2=(wcpt2~eng);
wcinc3=(wcpt3~eng);
wcinc4=(wcpt4~eng);

wcd1=sumc(wcinc1');
wcd2=sumc(wcinc2');
wcd3=sumc(wcinc3');
wcd4=sumc(wcinc4');

wcnew1=ln(wcd1);
wcnew2=ln(wcd2);
wcnew3=ln(wcd3);
wcnew4=ln(wcd4);

z1=(lndold-wcnew1)/bmod1[1,1];
z2=(lndold-wcnew2)/bmod1[1,1];
z3=(lndold-wcnew3)/bmod1[1,1];
z4=(lndold-wcnew4)/bmod1[1,1];

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zz1=z1.*250;
zz2=z2.*250;
zz3=z3.*250;
zz4=z4.*250;

/* ***** */
/* loss of beaches utilities */
/* ***** */

slnj1=(e[.,2:46])^(bmod1[1,15]/bmod1[1,17]);
slnj2=(e[.,1:1]~e[.,3:46])^(bmod1[1,15]/bmod1[1,17]);
slnj3=(e[.,1:2]~e[.,4:46])^(bmod1[1,15]/bmod1[1,17]);
slnj4=(e[.,1:3]~e[.,5:46])^(bmod1[1,15]/bmod1[1,17]);
slnj5=(e[.,1:4]~e[.,6:46])^(bmod1[1,15]/bmod1[1,17]);
slnj6=(e[.,1:5]~e[.,7:46])^(bmod1[1,15]/bmod1[1,17]);
slnj7=(e[.,1:6]~e[.,8:46])^(bmod1[1,15]/bmod1[1,17]);
slnj8=(e[.,1:7]~e[.,9:46])^(bmod1[1,15]/bmod1[1,17]);
slnj9=(e[.,1:8]~e[.,10:46])^(bmod1[1,15]/bmod1[1,17]);
slnj10=(e[.,1:9]~e[.,11:46])^(bmod1[1,15]/bmod1[1,17]);
slnj11=(e[.,1:10]~e[.,12:46])^(bmod1[1,15]/bmod1[1,17]);
slnj12=(e[.,1:11]~e[.,13:46])^(bmod1[1,15]/bmod1[1,17]);
slnj13=(e[.,1:12]~e[.,14:46])^(bmod1[1,15]/bmod1[1,17]);
slnj14=(e[.,1:13]~e[.,15:46])^(bmod1[1,15]/bmod1[1,17]);
slnj15=(e[.,1:14]~e[.,16:46])^(bmod1[1,15]/bmod1[1,17]);
slnj16=(e[.,1:15]~e[.,17:46])^(bmod1[1,15]/bmod1[1,17]);
slnj17=(e[.,1:16]~e[.,18:46])^(bmod1[1,15]/bmod1[1,17]);
slnj18=(e[.,1:17]~e[.,19:46])^(bmod1[1,15]/bmod1[1,17]);
slnj19=(e[.,1:18]~e[.,20:46])^(bmod1[1,15]/bmod1[1,17]);
slnj20=(e[.,1:19]~e[.,21:46])^(bmod1[1,15]/bmod1[1,17]);
slnj21=(e[.,1:20]~e[.,22:46])^(bmod1[1,15]/bmod1[1,17]);
slnj22=(e[.,1:21]~e[.,23:46])^(bmod1[1,15]/bmod1[1,17]);
slnj23=(e[.,1:22]~e[.,24:46])^(bmod1[1,15]/bmod1[1,17]);
slnj24=(e[.,1:23]~e[.,25:46])^(bmod1[1,15]/bmod1[1,17]);
slnj25=(e[.,1:24]~e[.,26:46])^(bmod1[1,15]/bmod1[1,17]);
slnj26=(e[.,1:25]~e[.,27:46])^(bmod1[1,15]/bmod1[1,17]);
slnj27=(e[.,1:26]~e[.,28:46])^(bmod1[1,15]/bmod1[1,17]);
slnj28=(e[.,1:27]~e[.,29:46])^(bmod1[1,15]/bmod1[1,17]);
slnj29=(e[.,1:28]~e[.,30:46])^(bmod1[1,15]/bmod1[1,17]);
slnj30=(e[.,1:29]~e[.,31:46])^(bmod1[1,15]/bmod1[1,17]);
slnj31=(e[.,1:30]~e[.,32:46])^(bmod1[1,15]/bmod1[1,17]);
slnj32=(e[.,1:31]~e[.,33:46])^(bmod1[1,15]/bmod1[1,17]);
slnj33=(e[.,1:32]~e[.,34:46])^(bmod1[1,15]/bmod1[1,17]);
slnj34=(e[.,1:33]~e[.,35:46])^(bmod1[1,15]/bmod1[1,17]);
slnj35=(e[.,1:34]~e[.,36:46])^(bmod1[1,15]/bmod1[1,17]);
slnj36=(e[.,1:35]~e[.,37:46])^(bmod1[1,15]/bmod1[1,17]);
slnj37=(e[.,1:36]~e[.,38:46])^(bmod1[1,15]/bmod1[1,17]);
slnj38=(e[.,1:37]~e[.,39:46])^(bmod1[1,15]/bmod1[1,17]);
slnj39=(e[.,1:38]~e[.,40:46])^(bmod1[1,15]/bmod1[1,17]);
slnj40=(e[.,1:39]~e[.,41:46])^(bmod1[1,15]/bmod1[1,17]);
slnj41=(e[.,1:40]~e[.,42:46])^(bmod1[1,15]/bmod1[1,17]);
slnj42=(e[.,1:41]~e[.,43:46])^(bmod1[1,15]/bmod1[1,17]);
slnj43=(e[.,1:42]~e[.,44:46])^(bmod1[1,15]/bmod1[1,17]);
slnj44=(e[.,1:43]~e[.,45:46])^(bmod1[1,15]/bmod1[1,17]);
slnj45=(e[.,1:44]~e[.,46:46])^(bmod1[1,15]/bmod1[1,17]);
slnj46=(e[.,1:45])^(bmod1[1,15]/bmod1[1,17]);

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slde47=(e[.,48:62])^(bmod1[1,16]/bmod1[1,17]);
slde48=(e[.,47:47]~e[.,49:62])^(bmod1[1,16]/bmod1[1,17]);
slde49=(e[.,47:48]~e[.,50:62])^(bmod1[1,16]/bmod1[1,17]);
slde50=(e[.,47:49]~e[.,51:62])^(bmod1[1,16]/bmod1[1,17]);
slde51=(e[.,47:50]~e[.,52:62])^(bmod1[1,16]/bmod1[1,17]);
slde52=(e[.,47:51]~e[.,53:62])^(bmod1[1,16]/bmod1[1,17]);
slde53=(e[.,47:52]~e[.,54:62])^(bmod1[1,16]/bmod1[1,17]);
slde54=(e[.,47:53]~e[.,55:62])^(bmod1[1,16]/bmod1[1,17]);
slde55=(e[.,47:54]~e[.,56:62])^(bmod1[1,16]/bmod1[1,17]);
slde56=(e[.,47:55]~e[.,57:62])^(bmod1[1,16]/bmod1[1,17]);
slde57=(e[.,47:56]~e[.,58:62])^(bmod1[1,16]/bmod1[1,17]);
slde58=(e[.,47:57]~e[.,59:62])^(bmod1[1,16]/bmod1[1,17]);
slde59=(e[.,47:58]~e[.,60:62])^(bmod1[1,16]/bmod1[1,17]);
slde60=(e[.,47:59]~e[.,61:62])^(bmod1[1,16]/bmod1[1,17]);
slde61=(e[.,47:60]~e[.,62:62])^(bmod1[1,16]/bmod1[1,17]);
slde62=(e[.,47:61])^(bmod1[1,16]/bmod1[1,17]);

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slml1=(e[.,1:46])^(bmod1[1,15]/bmod1[1,17]); /* all delmarva */
slml2=(e[.,61:62])^(bmod1[1,16]/bmod1[1,17]); /* all delaware */
slml3=(e[.,54:62])^(bmod1[1,16]/bmod1[1,17]); /* DE north */
slml4=(e[.,47:53]~e[.,61:62])^(bmod1[1,16]/bmod1[1,17]); /* DE south */

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slpt1=(slnj1~inclusde)^(bmod1[1,17]);
slpt2=(slnj2~inclusde)^(bmod1[1,17]);
slpt3=(slnj3~inclusde)^(bmod1[1,17]);
slpt4=(slnj4~inclusde)^(bmod1[1,17]);
slpt5=(slnj5~inclusde)^(bmod1[1,17]);
slpt6=(slnj6~inclusde)^(bmod1[1,17]);
slpt7=(slnj7~inclusde)^(bmod1[1,17]);
slpt8=(slnj8~inclusde)^(bmod1[1,17]);
slpt9=(slnj9~inclusde)^(bmod1[1,17]);
slpt10=(slnj10~inclusde)^(bmod1[1,17]);
slpt11=(slnj11~inclusde)^(bmod1[1,17]);
slpt12=(slnj12~inclusde)^(bmod1[1,17]);
slpt13=(slnj13~inclusde)^(bmod1[1,17]);
slpt14=(slnj14~inclusde)^(bmod1[1,17]);
slpt15=(slnj15~inclusde)^(bmod1[1,17]);
slpt16=(slnj16~inclusde)^(bmod1[1,17]);
slpt17=(slnj17~inclusde)^(bmod1[1,17]);
slpt18=(slnj18~inclusde)^(bmod1[1,17]);
slpt19=(slnj19~inclusde)^(bmod1[1,17]);
slpt20=(slnj20~inclusde)^(bmod1[1,17]);
slpt21=(slnj21~inclusde)^(bmod1[1,17]);
slpt22=(slnj22~inclusde)^(bmod1[1,17]);
slpt23=(slnj23~inclusde)^(bmod1[1,17]);
slpt24=(slnj24~inclusde)^(bmod1[1,17]);
slpt25=(slnj25~inclusde)^(bmod1[1,17]);
slpt26=(slnj26~inclusde)^(bmod1[1,17]);
slpt27=(slnj27~inclusde)^(bmod1[1,17]);
slpt28=(slnj28~inclusde)^(bmod1[1,17]);
slpt29=(slnj29~inclusde)^(bmod1[1,17]);
slpt30=(slnj30~inclusde)^(bmod1[1,17]);
slpt31=(slnj31~inclusde)^(bmod1[1,17]);
slpt32=(slnj32~inclusde)^(bmod1[1,17]);
slpt33=(slnj33~inclusde)^(bmod1[1,17]);
slpt34=(slnj34~inclusde)^(bmod1[1,17]);

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slpt35=(slnj35~inclusde)^(bmod1[1,17]);
slpt36=(slnj36~inclusde)^(bmod1[1,17]);
slpt37=(slnj37~inclusde)^(bmod1[1,17]);
slpt38=(slnj38~inclusde)^(bmod1[1,17]);
slpt39=(slnj39~inclusde)^(bmod1[1,17]);
slpt40=(slnj40~inclusde)^(bmod1[1,17]);
slpt41=(slnj41~inclusde)^(bmod1[1,17]);
slpt42=(slnj42~inclusde)^(bmod1[1,17]);
slpt43=(slnj43~inclusde)^(bmod1[1,17]);
slpt44=(slnj44~inclusde)^(bmod1[1,17]);
slpt45=(slnj45~inclusde)^(bmod1[1,17]);
slpt46=(slnj46~inclusde)^(bmod1[1,17]);
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slpt47=(inclusnj~slde47)^(bmod1[1,17]);
slpt48=(inclusnj~slde48)^(bmod1[1,17]);
slpt49=(inclusnj~slde49)^(bmod1[1,17]);
slpt50=(inclusnj~slde50)^(bmod1[1,17]);
slpt51=(inclusnj~slde51)^(bmod1[1,17]);
slpt52=(inclusnj~slde52)^(bmod1[1,17]);
slpt53=(inclusnj~slde53)^(bmod1[1,17]);
slpt54=(inclusnj~slde54)^(bmod1[1,17]);
slpt55=(inclusnj~slde55)^(bmod1[1,17]);
slpt56=(inclusnj~slde56)^(bmod1[1,17]);
slpt57=(inclusnj~slde57)^(bmod1[1,17]);
slpt58=(inclusnj~slde58)^(bmod1[1,17]);
slpt59=(inclusnj~slde59)^(bmod1[1,17]);
slpt60=(inclusnj~slde60)^(bmod1[1,17]);
slpt61=(inclusnj~slde61)^(bmod1[1,17]);
slpt62=(inclusnj~slde62)^(bmod1[1,17]);
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```
slptml1=(slml1)^(bmod1[1,17]);
slptml2=(inclusnj~slml2)^(bmod1[1,17]);
slptml3=(inclusnj~slml3)^(bmod1[1,17]);
slptml4=(inclusnj~slml4)^(bmod1[1,17]);
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```
slinc1=slpt1~eng;
slinc2=slpt2~eng;
slinc3=slpt3~eng;
slinc4=slpt4~eng;
slinc5=slpt5~eng;
slinc6=slpt6~eng;
slinc7=slpt7~eng;
slinc8=slpt8~eng;
slinc9=slpt9~eng;
slinc10=slpt10~eng;
slinc11=slpt11~eng;
slinc12=slpt12~eng;
slinc13=slpt13~eng;
slinc14=slpt14~eng;
slinc15=slpt15~eng;
slinc16=slpt16~eng;
slinc17=slpt17~eng;
slinc18=slpt18~eng;
slinc19=slpt19~eng;
slinc20=slpt20~eng;
slinc21=slpt21~eng;
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slinc22=slpt22~eng;  
slinc23=slpt23~eng;  
slinc24=slpt24~eng;  
slinc25=slpt25~eng;  
slinc26=slpt26~eng;  
slinc27=slpt27~eng;  
slinc28=slpt28~eng;  
slinc29=slpt29~eng;  
slinc30=slpt30~eng;  
slinc31=slpt31~eng;  
slinc32=slpt32~eng;  
slinc33=slpt33~eng;  
slinc34=slpt34~eng;  
slinc35=slpt35~eng;  
slinc36=slpt36~eng;  
slinc37=slpt37~eng;  
slinc38=slpt38~eng;  
slinc39=slpt39~eng;  
slinc40=slpt40~eng;  
slinc41=slpt41~eng;  
slinc42=slpt42~eng;  
slinc43=slpt43~eng;  
slinc44=slpt44~eng;  
slinc45=slpt45~eng;  
slinc46=slpt46~eng;  
slinc47=slpt47~eng;  
slinc48=slpt48~eng;  
slinc49=slpt49~eng;  
slinc50=slpt50~eng;  
slinc51=slpt51~eng;  
slinc52=slpt52~eng;  
slinc53=slpt53~eng;  
slinc54=slpt54~eng;  
slinc55=slpt55~eng;  
slinc56=slpt56~eng;  
slinc57=slpt57~eng;  
slinc58=slpt58~eng;  
slinc59=slpt59~eng;  
slinc60=slpt60~eng;  
slinc61=slpt61~eng;  
slinc62=slpt62~eng;
```

```
slminc1=slptml1~eng;  
slminc2=slptml2~eng;  
slminc3=slptml3~eng;  
slminc4=slptml4~eng;
```

```
sld1=sumc(slinc1');  
sld2=sumc(slinc2');  
sld3=sumc(slinc3');  
sld4=sumc(slinc4');  
sld5=sumc(slinc5');  
sld6=sumc(slinc6');  
sld7=sumc(slinc7');  
sld8=sumc(slinc8');  
sld9=sumc(slinc9');
```

```
sld10=sumc(slinc10');
sld11=sumc(slinc11');
sld12=sumc(slinc12');
sld13=sumc(slinc13');
sld14=sumc(slinc14');
sld15=sumc(slinc15');
sld16=sumc(slinc16');
sld17=sumc(slinc17');
sld18=sumc(slinc18');
sld19=sumc(slinc19');
sld20=sumc(slinc20');
sld21=sumc(slinc21');
sld22=sumc(slinc22');
sld23=sumc(slinc23');
sld24=sumc(slinc24');
sld25=sumc(slinc25');
sld26=sumc(slinc26');
sld27=sumc(slinc27');
sld28=sumc(slinc28');
sld29=sumc(slinc29');
sld30=sumc(slinc30');
sld31=sumc(slinc31');
sld32=sumc(slinc32');
sld33=sumc(slinc33');
sld34=sumc(slinc34');
sld35=sumc(slinc35');
sld36=sumc(slinc36');
sld37=sumc(slinc37');
sld38=sumc(slinc38');
sld39=sumc(slinc39');
sld40=sumc(slinc40');
sld41=sumc(slinc41');
sld42=sumc(slinc42');
sld43=sumc(slinc43');
sld44=sumc(slinc44');
sld45=sumc(slinc45');
sld46=sumc(slinc46');
sld47=sumc(slinc47');
sld48=sumc(slinc48');
sld49=sumc(slinc49');
sld50=sumc(slinc50');
sld51=sumc(slinc51');
sld52=sumc(slinc52');
sld53=sumc(slinc53');
sld54=sumc(slinc54');
sld55=sumc(slinc55');
sld56=sumc(slinc56');
sld57=sumc(slinc57');
sld58=sumc(slinc58');
sld59=sumc(slinc59');
sld60=sumc(slinc60');
sld61=sumc(slinc61');
sld62=sumc(slinc62');

slmd1=sumc(slminc1');
slmd2=sumc(slminc2');
slmd3=sumc(slminc3');
```

```
slmd4=sumc(slminc4');
```

```
lndnew1=ln(sld1);  
lndnew2=ln(sld2);  
lndnew3=ln(sld3);  
lndnew4=ln(sld4);  
lndnew5=ln(sld5);  
lndnew6=ln(sld6);  
lndnew7=ln(sld7);  
lndnew8=ln(sld8);  
lndnew9=ln(sld9);  
lndnew10=ln(sld10);  
lndnew11=ln(sld11);  
lndnew12=ln(sld12);  
lndnew13=ln(sld13);  
lndnew14=ln(sld14);  
lndnew15=ln(sld15);  
lndnew16=ln(sld16);  
lndnew17=ln(sld17);  
lndnew18=ln(sld18);  
lndnew19=ln(sld19);  
lndnew20=ln(sld20);  
lndnew21=ln(sld21);  
lndnew22=ln(sld22);  
lndnew23=ln(sld23);  
lndnew24=ln(sld24);  
lndnew25=ln(sld25);  
lndnew26=ln(sld26);  
lndnew27=ln(sld27);  
lndnew28=ln(sld28);  
lndnew29=ln(sld29);  
lndnew30=ln(sld30);  
lndnew31=ln(sld31);  
lndnew32=ln(sld32);  
lndnew33=ln(sld33);  
lndnew34=ln(sld34);  
lndnew35=ln(sld35);  
lndnew36=ln(sld36);  
lndnew37=ln(sld37);  
lndnew38=ln(sld38);  
lndnew39=ln(sld39);  
lndnew40=ln(sld40);  
lndnew41=ln(sld41);  
lndnew42=ln(sld42);  
lndnew43=ln(sld43);  
lndnew44=ln(sld44);  
lndnew45=ln(sld45);  
lndnew46=ln(sld46);  
lndnew47=ln(sld47);  
lndnew48=ln(sld48);  
lndnew49=ln(sld49);  
lndnew50=ln(sld50);  
lndnew51=ln(sld51);  
lndnew52=ln(sld52);  
lndnew53=ln(sld53);  
lndnew54=ln(sld54);
```

```
lndnew55=ln(sld55);
lndnew56=ln(sld56);
lndnew57=ln(sld57);
lndnew58=ln(sld58);
lndnew59=ln(sld59);
lndnew60=ln(sld60);
lndnew61=ln(sld61);
lndnew62=ln(sld62);
```

```
lndpnw1=ln(slmd1);
lndpnw2=ln(slmd2);
lndpnw3=ln(slmd3);
lndpnw4=ln(slmd4);
```

```
c1=(lndold-lndnew1)/bmod1[1,1];
c2=(lndold-lndnew2)/bmod1[1,1];
c3=(lndold-lndnew3)/bmod1[1,1];
c4=(lndold-lndnew4)/bmod1[1,1];
c5=(lndold-lndnew5)/bmod1[1,1];
c6=(lndold-lndnew6)/bmod1[1,1];
c7=(lndold-lndnew7)/bmod1[1,1];
c8=(lndold-lndnew8)/bmod1[1,1];
c9=(lndold-lndnew9)/bmod1[1,1];
c10=(lndold-lndnew10)/bmod1[1,1];
c11=(lndold-lndnew11)/bmod1[1,1];
c12=(lndold-lndnew12)/bmod1[1,1];
c13=(lndold-lndnew13)/bmod1[1,1];
c14=(lndold-lndnew14)/bmod1[1,1];
c15=(lndold-lndnew15)/bmod1[1,1];
c16=(lndold-lndnew16)/bmod1[1,1];
c17=(lndold-lndnew17)/bmod1[1,1];
c18=(lndold-lndnew18)/bmod1[1,1];
c19=(lndold-lndnew19)/bmod1[1,1];
c20=(lndold-lndnew20)/bmod1[1,1];
c21=(lndold-lndnew21)/bmod1[1,1];
c22=(lndold-lndnew22)/bmod1[1,1];
c23=(lndold-lndnew23)/bmod1[1,1];
c24=(lndold-lndnew24)/bmod1[1,1];
c25=(lndold-lndnew25)/bmod1[1,1];
c26=(lndold-lndnew26)/bmod1[1,1];
c27=(lndold-lndnew27)/bmod1[1,1];
c28=(lndold-lndnew28)/bmod1[1,1];
c29=(lndold-lndnew29)/bmod1[1,1];
c30=(lndold-lndnew30)/bmod1[1,1];
c31=(lndold-lndnew31)/bmod1[1,1];
c32=(lndold-lndnew32)/bmod1[1,1];
c33=(lndold-lndnew33)/bmod1[1,1];
c34=(lndold-lndnew34)/bmod1[1,1];
c35=(lndold-lndnew35)/bmod1[1,1];
c36=(lndold-lndnew36)/bmod1[1,1];
c37=(lndold-lndnew37)/bmod1[1,1];
c38=(lndold-lndnew38)/bmod1[1,1];
c39=(lndold-lndnew39)/bmod1[1,1];
c40=(lndold-lndnew40)/bmod1[1,1];
c41=(lndold-lndnew41)/bmod1[1,1];
c42=(lndold-lndnew42)/bmod1[1,1];
```

```
c43=(lndold-lndnew43)/bmod1[1,1];
c44=(lndold-lndnew44)/bmod1[1,1];
c45=(lndold-lndnew45)/bmod1[1,1];
c46=(lndold-lndnew46)/bmod1[1,1];
c47=(lndold-lndnew47)/bmod1[1,1];
c48=(lndold-lndnew48)/bmod1[1,1];
c49=(lndold-lndnew49)/bmod1[1,1];
c50=(lndold-lndnew50)/bmod1[1,1];
c51=(lndold-lndnew51)/bmod1[1,1];
c52=(lndold-lndnew52)/bmod1[1,1];
c53=(lndold-lndnew53)/bmod1[1,1];
c54=(lndold-lndnew54)/bmod1[1,1];
c55=(lndold-lndnew55)/bmod1[1,1];
c56=(lndold-lndnew56)/bmod1[1,1];
c57=(lndold-lndnew57)/bmod1[1,1];
c58=(lndold-lndnew58)/bmod1[1,1];
c59=(lndold-lndnew59)/bmod1[1,1];
c60=(lndold-lndnew60)/bmod1[1,1];
c61=(lndold-lndnew61)/bmod1[1,1];
c62=(lndold-lndnew62)/bmod1[1,1];
```

```
cp1=(lndold-lndpnw1)/bmod1[1,1];
cp2=(lndold-lndpnw2)/bmod1[1,1];
cp3=(lndold-lndpnw3)/bmod1[1,1];
cp4=(lndold-lndpnw4)/bmod1[1,1];
```

```
cc1=c1.*250;
cc2=c2.*250;
cc3=c3.*250;
cc4=c4.*250;
cc5=c5.*250;
cc6=c6.*250;
cc7=c7.*250;
cc8=c8.*250;
cc9=c9.*250;
cc10=c10.*250;
cc11=c11.*250;
cc12=c12.*250;
cc13=c13.*250;
cc14=c14.*250;
cc15=c15.*250;
cc16=c16.*250;
cc17=c17.*250;
cc18=c18.*250;
cc19=c19.*250;
cc20=c20.*250;
cc21=c21.*250;
cc22=c22.*250;
cc23=c23.*250;
cc24=c24.*250;
cc25=c25.*250;
cc26=c26.*250;
cc27=c27.*250;
cc28=c28.*250;
cc29=c29.*250;
cc30=c30.*250;
```

```

cc31=c31.*250;
cc32=c32.*250;
cc33=c33.*250;
cc34=c34.*250;
cc35=c35.*250;
cc36=c36.*250;
cc37=c37.*250;
cc38=c38.*250;
cc39=c39.*250;
cc40=c40.*250;
cc41=c41.*250;
cc42=c42.*250;
cc43=c43.*250;
cc44=c44.*250;
cc45=c45.*250;
cc46=c46.*250;
cc47=c47.*250;
cc48=c48.*250;
cc49=c49.*250;
cc50=c50.*250;
cc51=c51.*250;
cc52=c52.*250;
cc53=c53.*250;
cc54=c54.*250;
cc55=c55.*250;
cc56=c56.*250;
cc57=c57.*250;
cc58=c58.*250;
cc59=c59.*250;
cc60=c60.*250;
cc61=c61.*250;
cc62=c62.*250;

ccp1=cp1.*250;
ccp2=cp2.*250;
ccp3=cp3.*250;
ccp4=cp4.*250;

/* ***** */
/*      create matrix of welfare values and create county matrix      */
/* ***** */

welfmat=county~cc1~cc2~cc3~cc4~cc5~cc6~cc7~cc8~cc9~cc10~
cc11~cc12~cc13~cc14~cc15~cc16~cc17~cc18~cc19~cc20~
cc21~cc22~cc23~cc24~cc25~cc26~cc27~cc28~cc29~cc30~
cc31~cc32~cc33~cc34~cc35~cc36~cc37~cc38~cc39~cc40~
cc41~cc42~cc43~cc44~cc45~cc46~cc47~cc48~cc49~cc50~
cc51~cc52~cc53~cc54~cc55~cc56~cc57~cc58~cc59~cc60~
cc61~cc62~ccp1~ccp2~ccp3~ccp4~zz1~zz2~zz3~zz4;

let ncwelfa[1,71]=0;
let kwelfa[1,71]=0;
let swelfa[1,71]=0;

for i (1, rows(welfmat), 1);

```

```

        if welfmat[i,1]==1;
            ncwelfa=ncwelfa|welfmat[i,.];

        elseif welfmat[i,1]==2;
            kwelfa=kwelfa|welfmat[i,.];

        else;
            swelfa=swelfa|welfmat[i,.];

        endif;

    endfor;

    rn=rows(ncwelfa);
    ncwelf=ncwelfa[2:rn,1:71];

    rk=rows(kwelfa);
    kwelf=kwelfa[2:rk,1:71];

    rs=rows(swelfa);
    swelf=swelfa[2:rs,1:71];

    print "new castle county welfare matrix ";
    print rows(ncwelf);
    print cols(ncwelf);
    print;
    print "kent county welfare matrix ";
    print rows(kwelf);
    print cols(kwelf);
    print;
    print "sussex county welfare matrix ";
    print rows(swelf);
    print cols(swelf);
    print;

/* ***** */
/*          saves each welfare matrix as a gauss data set to do          */
/*          statistics (dstat command)                                     */
/* ***** */

    vvv= {county, cc1, cc2, cc3, cc4, cc5, cc6, cc7, cc8, cc9, cc10,
    cc11, cc12, cc13, cc14, cc15, cc16, cc17, cc18, cc19, cc20,
    cc21, cc22, cc23, cc24, cc25, cc26, cc27, cc28, cc29, cc30,
    cc31, cc32, cc33, cc34, cc35, cc36, cc37, cc38, cc39, cc40,
    cc41, cc42, cc43, cc44, cc45, cc46, cc47, cc48, cc49, cc50,
    cc51, cc52, cc53, cc54, cc55, cc56, cc57, cc58, cc59, cc60,
    cc61, cc62, ml1, ml2, ml3, ml4, zz1, zz2, zz3, zz4 };

    y0=saved(welfmat,"welfmat",vvv);
    print "y0 " y0;

    y1=saved(ncwelf,"ncwelf",vvv);
    print "y1 " y1;

    y2=saved(kwelf,"kwelf",vvv);
    print "y2 " y2;

```

```

y3=saved(swelf,"swelf",vvv);
print "y3 " y3;
print;

/* ***** */
/*          get summary welfare statistics          */
/*          mean, variance, st.d, min, max, valid, missing      */
/*          all values produced are per person per season      */
/*          (A season is taken to be 250 trip occasions)        */
/*          c1-c62 loss of individual beaches                  */
/*          ml1 loose all delmarva                             */
/*          ml2 loose all delaware                             */
/*          ml3 loose northern DE                              */
/*          ml4 loose southern DE                              */
/*          zz1 erosion-North Shores to Indian Beach          */
/*          zz2 erosion-North Bethany to South Bethany         */
/*          zz3 erosion-Fenwick Island                         */
/*          zz4 erosion-all developed beaches                 */
/* ***** */

print "total sample ";
dstat("welfmat",vvv);
print;

print "new castle county ";
dstat("ncwelf",vvv);
print;

print "kent county ";
dstat("kwelf", vv);
print;

print "sussex county ";
dstat("swelf", vv);
print;

output off;

```