Applied Survival Analysis
Solutions to Lab 6: Model Selection in Survival Analysis

Step 1:

(a)

Predictor	*Estimate*	*s.e.*	*p-value*	*HR*
agecat	0.366	0.093	<0.001	1.443
sex	0.236	0.145	0.104	1.266
cd4	-0.012	0.002	<0.001	0.988
karnof	-0.045	0.005	<0.001	0.956
ivdrug	0.102	0.122	0.403	1.108
antiret	-0.214	0.099	0.030	0.808
rif	-0.087	0.107	0.417	0.916
clari	-0.115	0.108	0.285	0.891

No, according to the Wald test below for the combined effect of therapy.

```
. test rif clari

 ( 1)  rif = 0
 ( 2)  clari = 0

           chi2(  2) =    1.26
         Prob > chi2 =    0.5338
```

Step 2:

(i)

```
stcox agecat sex cd4 karnof antiret

         failure _d:  dthstat
   analysis time _t:  dthtime

Iteration 0:   log likelihood = -3393.2516
Iteration 1:   log likelihood = -3320.1521
Iteration 2:   log likelihood = -3318.3667
Iteration 3:   log likelihood = -3318.3627
Refining estimates:
Iteration 0:   log likelihood = -3318.3627

Cox regression -- Breslow method for ties

No. of subjects =         1175                     Number of obs   =      1175
No. of failures =          514
Time at risk    =       619081
                                                   LR chi2(5)      =    149.78
Log likelihood  =   -3318.3627                     Prob > chi2     =    0.0000

------------------------------------------------------------------------------
          _t |
          _d | Haz. Ratio   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
      agecat |   1.420866   .1334364      3.740   0.000       1.181993    1.708013
         sex |   1.369403   .2001345      2.151   0.031       1.028326    1.823611
         cd4 |   .9895408    .001542     -6.747   0.000       .9865232    .9925676
      karnof |   .9626493   .0049101     -7.463   0.000       .9530736    .9723211
     antiret |   .7926794   .0786474     -2.342   0.019        .652595    .9628339
------------------------------------------------------------------------------
```

Step 3:

(b) No!

Step 4:

(c)

```
sw stcox (agecat sex cd4 karnof antiret ) agsex agcd4 agkar aganti sexcd4
sexkar sexanti cd4kar cd4anti karanti , pr(0.10) lockterm1

                      begin with full model
p = 0.6678 >= 0.1000  removing sexkar
p = 0.6824 >= 0.1000  removing cd4anti
p = 0.6198 >= 0.1000  removing agkar
p = 0.4497 >= 0.1000  removing sexcd4
p = 0.4415 >= 0.1000  removing agsex
p = 0.4253 >= 0.1000  removing aganti
p = 0.3833 >= 0.1000  removing agcd4
p = 0.1945 >= 0.1000  removing cd4kar

Cox regression -- Breslow method for ties
Entry time 0                                      Number of obs   =       1177
                                                  LR chi2(7)      =     157.92
                                                  Prob > chi2     =     0.0000
Log likelihood = -3314.2937                       Pseudo R2       =     0.0233

------------------------------------------------------------------------------
 dthtime |
 dthstat |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
---------+--------------------------------------------------------------------
  agecat |   .3437417   .0940113      3.656   0.000       .1594829    .5280005
     sex |   .8843465   .2824466      3.131   0.002       .3307613    1.437932
     cd4 |  -.0105746   .0015664     -6.751   0.000      -.0136447   -.0075045
  karnof |  -.0536794   .0090049     -5.961   0.000      -.0713287   -.0360302
 antiret |  -2.025895     .91396     -2.217   0.027      -3.817224   -.2345663
 karanti |   .0219047   .0107868      2.031   0.042       .0007629    .0430465
 sexanti |  -.7179042   .3291002     -2.181   0.029      -1.362929   -.0728797
------------------------------------------------------------------------------
```

(d)

Model	***Covariates***	***-2logL***	***q***	***AIC***
Step 2 (i)	agecat,karnof,sex, cd4,antiret	6636.7	5	6651.7
Step 2 (ii)	(same as above)			
Step 3	(same as above)			
Step 4	Step3 +karnof*antiret,sex*antiret	6628.6	7	6649.6
Step 5	agecat,karnof, cd4	6645.6	3	6654.6
Step 6 (i)	agecat,karnof,sex, cd4cat, antiret	6654.0	5	6669.0
Step 6 (ii)	age, karnof, sex, cd4, antiret	6633.4	5	6648.4

According to AIC criterion the best model is the model in Step 6 (ii), the one with the smallest AIC .