Stat776 **HW11** **not to be collected**

1. Data file ex.txt contains y1, y2, x1, x2, x3 and x4.

   Find the first principal component for $\mathbf{z}$, the standardized $\mathbf{x} = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$.

```
data a;
     infile "D:\ex.txt";
     input y1 y2 x1 x2 x3 x4 @@;
proc princomp;
     var x1 x2 x3;
     run;
```

   The first principal component for $\mathbf{z}$ is $y_{1*} = 0.3359z_1 - 0.6619z_2 + 0.6701z_3$.

2. For data in 1, let prin1 and prin2 be the first two principal components for $\mathbf{z}$, the standardized $\mathbf{x} = \begin{pmatrix} x_1 \\ x_2 \\ x_3 \end{pmatrix}$. Test the usefulness of the model $\begin{pmatrix} y_1 \\ y_2 \end{pmatrix} = \beta_0 + \beta_1(\text{prin1}) + \beta_2(\text{prin2}) + \epsilon$.

```
data a;
    infile "D:\ex.txt";
    input y1 y2 x1 x2 x3 x4 @@;
proc princomp out=b;
    var x1 x2 x3;
    run;
proc reg;
    y1 y2=prin1 prin2/noprint;
    mtest prin1=0, prin2=0;
    run;
```

H_0 : $\beta_i = 0$ for all $i = 1, 2$ versus H_a : $\beta_i \neq 0$ for some $i = 1, 2$
Test Statistic: $\Lambda = \frac{|E|}{|E+H|}$
p-value: $P(\Lambda \leq \Lambda_{ob}|H_0)$

$\Lambda = 0.2802$; p-value: $P(F(4, 6) > 1.33) = 0.3577$
Fail to reject H_0
Data do not show evidence of the contribution of prin1 and prin2.