3)

Projection matrices of rank 1

Simply take

$$A_1 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix} \text{ and } B_1 = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

Projection matrices of rank 2

Simply take

$$A_2 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{pmatrix} \text{ and } B_2 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

In [1]:
```
library("car",lib.loc="~/Rpackages")
library("carData",lib.loc="~/Rpackages")
library("effects",lib.loc="~/Rpackages")
library("alr4",lib.loc="~/Rpackages")
```

```
Attaching package: ‘carData’

The following objects are masked from ‘package:car’:

    Guyer, UN, Vocab

lattice theme set by effectsTheme()
See ?effectsTheme for details.
```

In [2]:
```
plot(log(UN11[,'ppgdp']),log(UN11[,'fertility']),xlab="log(GDP per person)",yl
ab="log(birth rate)")
```