Math 4939 March 17, 2021

Consider the model:

```
fit <- lm(mathach ~ ses + cvar(ses, school), hs)
wald(fit)
```

```
   numDF denDF  F.value p.value
       3  1974 2811.078 <.0001

                   Estimate  Std.Error DF   t-value   p-value Lower 0.95
(Intercept)        12.931122 0.142416  1974 90.797963 <.00001 12.651820
ses                 2.223185 0.223174  1974  9.961687 <.00001  1.785505
cvar(ses, school)  3.288688 0.419322  1974  7.842871 <.00001  2.466328
                   Upper 0.95
(Intercept)        13.210425
ses                 2.660866
cvar(ses, school)  4.111048
```

1. Draw a diagram showing the estimated relationship between 'mathach' and 'ses' for values of ses ranging from -2 to 2, for:
    a. a school with mean ses equal to 0, and for
    b. a school with mean ses equal to 1.

    Be sure to indicate clearly where the estimated coefficients in the model appear in the diagram.
2. In what sense is the model:

```
fit2 <- lm(mathach ~ dvar(ses, school) + cvar(ses, school), hs)
```

equivalent to the former model. Explain clearly.