Math 4939 March 31, 2021

Quiz 9

```
fit <- lme(mathach ~ ses + cvar(ses, school),
           data = hs,
           random = ~ 1 + dvar(ses, school) | school)
summary(fit)
```

```
Random effects:
 Formula: ~1 + dvar(ses, school) | school
 Structure: General positive-definite, Log-Cholesky parametrization
                  StdDev    Corr
(Intercept)       1.5769374 (Intr)
dvar(ses, school) 0.8592063 -0.349
Residual          6.1085959

Fixed effects:  mathach ~ ses + cvar(ses, school)
                     Value Std.Error   DF  t-value
(Intercept)       12.837130 0.2867590 1936 44.76626
ses                2.212561 0.2569591 1936  8.61056
cvar(ses, school)  3.753722 0.7364900   38  5.09677
```

1. Draw lines showing the expected value of *mathach* as a function of *ses* for a school whose mean *ses* is equal to 0 and for a school whose mean *ses* is equal to 1. Label axes clearly so the position of the lines is not ambiguous.
2. What is the estimated variance of the **expected value** of *mathach* for a student whose *ses* = 2 in a school whose mean *ses* is equal to 1.
3. What is the estimated variance of the **value** of *mathach* for a student whose *ses* = 2 in a school whose mean *ses* is equal to 1.