Math 4939 March 16, 2022

Quiz 5

```
> dd <- as.data.frame(subset(Orthodont, Sex == 'Female'))
> head(dd, 2)
   distance age Subject    Sex
65       21   8     F01 Female
66       20  10     F01 Female
> fit <- lme(distance ~ age, dd, random = ~ 1 + age | Subject)
> summary(fit)
  Random effects:
   Formula: ~1 + age | Subject
   Structure: General positive-definite, Log-Cholesky parametrization
               StdDev    Corr
  (Intercept) 1.8841866 (Intr)
  age         0.1609278 -0.354
  Residual    0.6682746

  Fixed effects:  distance ~ age
                  Value Std.Error DF   t-value p-value
  (Intercept) 17.372727 0.7606027 32 22.840737       0
  age          0.479545 0.0662140 32  7.242353       0
```

Questions:

1. Calculate the estimated G matrix from this output.
2. Find the estimated standard deviation of the individual random regression lines when age is equal to 10.
3. At what age is this standard deviation minimized?