

Math 4939 March 16, 2022

Quing 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?