___Quiz_5_2022_03_16_Rscript.R

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```
library(spida2)
library(nlme)
```

```
##
## Attaching package: 'nlme'
```

```
## The following object is masked from 'package:spida2':
##
##     getData
```

```
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)
```

```
## Linear mixed-effects model fit by REML
##   Data: dd
##        AIC      BIC    logLik
##   149.4287 159.8547 -68.71435
##
## 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
##  Correlation:
##     (Intr)
## age -0.637
##
## Standardized Within-Group Residuals:
##         Min           Q1          Med           Q3          Max
## -1.85438223  -0.46784889   0.06779759   0.42976633   1.59215841
##
## Number of Observations: 44
## Number of Groups: 11
```

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?