1. In a random intercept model, ,
   1. is a fixed effect for a group level predictor, and is a random effect for group.
   2. is a random effect for a group level predictor, and is a fixed effect for group.
   3. is a fixed effect for an individual level predictor, and is a random effect for group.
   4. is a random effect for an individual level predictor, and is a fixed effect for group.
2. Which of the following is true of the random intercepts and slopes model:   
   1. There are five individual level predictors and two random/residual effects at the group level
   2. There are four fixed group level predictors, one random effect at the group level and one individual level residual effect
   3. There are four fixed group level predictors, one random effect and one group level residual
   4. There is one overall intercept, one individual level predictor, one group level predictor, two random effects, and one overall residual.
3. An interaction of group and individual effects indicates that:
   1. The slope parameter is predicted by a group level predictor
   2. The Intercept parameter is predicted by a group level predictor
   3. The slope parameter is correlated with the intercept parameter
   4. The slope parameter is both a fixed and random effect
4. In a random slope model:
   1. An individual predictor will be both a fixed and random effect
   2. A group level predictor will be both a fixed and random effect
   3. There will be an interaction between a group level predictor and a random effect
   4. All of the above
5. Grand mean centring occurs when
   1. A new variable is created by subtracting the group mean from the old variable
   2. A new variable is created by subtracting the overall mean from the old variable
   3. A new variable is created by subtracting the group variance from the old variable
   4. A new variable is created by subtracting the intercept mean from the old variable
6. Which describes the following model:  
   1. There are two individual level predictors (perf4yrc and ses\_mean), one group level predictor (ses), a fixed effect for group () and fixed slopes for SES by group ().
   2. There are two group level predictors (perf4yrc and ses\_mean), one individual level predictor (ses), a random effect for group () and random slopes for SES by group ().
   3. There are two group level predictors (perf4yrc and ses\_mean), one individual level predictor (ses), a fixed effect for group () and fixed slopes for SES by group ().
   4. There are two individual level predictors (perf4yrc and ses\_mean), one group level predictor (ses), a random effect for group () and random slopes for SES by group ().

The following questions use a dataset from a special issue of Leadership Quarterly edited by Paul Bliese, Ronald Halverson and Chet Schriesheim in 2002 (Vol 13). This data set has individual soldiers nested within companies. The three scales used in the analyses are Task Significance (TSIG), Hostility (HOSTILE) on the individual level, and Leadership Climate (GLEAD) on the group level.

We use the following model to fit the data

Where i indexes the individuals and j indexes the companies.

1. In this model we are suggesting that:
   1. Individual soldiers’ Hostility can be predicted with reported task significance, group leadership, the interaction between task significance and group leadership, and that hostility is otherwise the same for each company.
   2. Companies’ average hostility can be predicted with reported task significance, group leadership, and that hostility changes by company over and above what would otherwise be expected.
   3. Individual soldiers’ Hostility can be predicted with reported task significance, group leadership, the interaction between task significance and group leadership, and that hostility changes by company over and above what would otherwise be expected.
   4. Companies’ average hostility can be predicted with reported task significance, group leadership, and that the relationship between group leadership and task significance changes by company over and above what would otherwise be expected.

In running this model we get the following output:

> mod <- lmer(HOSTILE ~ TSIG + GLEAD + TSIG \* GLEAD + (1 + TSIG | COMPID))

> summary(mod)

Linear mixed model fit by REML. t-tests use Satterthwaite's method ['lmerModLmerTest']

Formula: HOSTILE ~ TSIG + GLEAD + TSIG \* GLEAD + (1 + TSIG | COMPID)

Data: lq2002

REML criterion at convergence: 5628.5

Scaled residuals:

Min 1Q Median 3Q Max

-2.2620 -0.6986 -0.2704 0.4777 3.5402

Random effects:

Groups Name Variance Std.Dev. Corr

COMPID (Intercept) 0.19887 0.4460

TSIG 0.01145 0.1070 -1.00

Residual 0.90154 0.9495

Number of obs: 2042, groups: COMPID, 49

Fixed effects:

Estimate Std. Error df t value Pr(>|t|)

(Intercept) 6.02038 1.05155 67.81280 5.725 2.57e-07 \*\*\*

TSIG -1.14605 0.28940 85.64340 -3.960 0.000154 \*\*\*

GLEAD -1.37996 0.34904 72.37997 -3.954 0.000177 \*\*\*

TSIG:GLEAD 0.27961 0.09584 90.47842 2.917 0.004450 \*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Correlation of Fixed Effects:

(Intr) TSIG GLEAD

TSIG -0.965

GLEAD -0.995 0.960

TSIG:GLEAD 0.962 -0.995 -0.966

1. The best interpretation is that:
   1. Perceived task significance predicts a lower amount of hostility
   2. Being in a group with better leadership leads to a lower predicted hostility
   3. Groups with higher rated level of group leadership and higher rated task significance have a higher level of predicted hostility
   4. All of the above