Answers to Exercises: Module 6

Question 1 is based on the Witness data set.

1. The following model predicts Perceived Accuracy from Memory, Honesty, Time Spent with Seniors at School, Sex of Witness, Age of Witness, and an interaction between Sex of Witness and Memory. Interpret the results.

Between-Subjects Factors

		Value Label	N
Witness's Sex	1	Male	113
	2	Female	103
The age of the witness	49		45
	69		59
	79		56
	89		56

ANOVA

Dependent Variable: ACCURATE

Source	Type III Sum of Squares	df	Mean Square	F	p
Model	105.784[a]	8	13.223	17.535	.000
Memory Centered	61.376	1	61.376	81.388	.000
Honesty Centered	5.788	1	5.788	7.676	.006
Time Spent with Seniors at School	1.222	1	1.222	1.621	.204
Age of Witness	2.289	3	.763	1.012	.388
Sex of Witness	.084	1	.084	.111	.739
Sex of Witness*Memory Centered	.397	1	.397	.527	.469
Error	156.100	207	.754		
Total	261.884	215			

Regression Coefficients

Dependent Variable: ACCURATE

Variable	B	se	t	p
Intercept	4.244	.157	27.092	.000
Memory Centered	.519	.080	6.468	.000
Honesty Centered	.204	.074	2.770	.006
Time Spent with Seniors at School	.029	.023	1.273	.204
Age49	-.306	.176	-1.742	.083
Age69	-.143	.163	-.877	.381
Age79	-.134	.165	-.812	.417
Sex of Witness	.040	.120	.333	.739
Sex of Witness * Memory Centered	.085	.118	.726	.469

Both Perceived Memory and Honesty are significant, but none of the other effects are. This indicates that once we control for Memory and Honesty, we can't confidently say the other terms in the model have associations with Accuracy that are inconsistent with the null hypothesis of no effect. But Memory and Honesty each have associations with Perceived Accuracy that are inconsistent with the null hypotheses that these associations = 0.

Memory has a coefficient of .519. But since Memory is involved in an interaction, this represents only the effect of Memory when Sex of the witness = 2 (Reference group, Female Witnesses). The effect of Memory when Sex of the witness = 1 (Male Witnesses) is .519 + .085 = .604. As per the p-value on the Sex_Witn*Mem_Cen interaction (p = .469), the difference between these two effects is not significant.*

Neither Time Spent with Seniors at School, Age of the Witness, nor Sex of the Witness had significant effects, after accounting for Memory or Honesty.

**The original coding of Sex of Winess was 1=Male, 2=Female. My software automatically dummy-coded this variable, recoding Female to 0, so it became the reference group.*

Question 2 is based on the Birth data set.

1. Run a model predicting birthweight (in pounds) from Infant's sex, smoking status (cig_rec), mother's race, mother's weight gain, gestation, gestation squared, mother's age, and month prenatal care began (treat as numerical).

Between-Subjects Factors

		Value Label	N
Infant Sex	1	Female	575
	2	Male	619
cig_rec	1	No	1105
	2	Yes	95
mrace	1	White	629
	2	Black	169
	3	Hispanic	296
	4	Other	106

ANOVA

Dependent Variable: Birthweight in Pounds

Source	Type III Sum of Squares	df	Mean Square	F	p
Model	807.947[a]	10	80.795	79.931	.000
Infant Sex	29.834	1	29.834	29.515	.000
Cigarette Recode Y/N	21.567	1	21.567	21.337	.000
Mother's Race	18.249	3	6.083	6.018	.000
Mother's Weight Gain	32.127	1	32.127	31.784	.000
Gestation Centered	242.101	1	242.101	239.513	.000
Gestation Centered Squared	37.266	1	37.266	36.868	.000
Mother's Age	12.505	1	12.505	12.372	.000
Month Prenatal Care Began	4.474	1	4.474	4.427	.036
Error	1201.846	1189	1.011		
Total	2009.793	1199			

Regression Coefficients

Dependent Variable: Birthweight in Pounds

Variable	B	se	t	p
Intercept	5.842	.234	24.936	.000
Female Infant	-.318	.058	-5.433	.000
Male Infant	0[a]	.	.	.
Cigarettes No	.511	.111	4.619	.000
Cigarettes Yes	0[a]	.	.	.
White	.265	.107	2.490	.013
Black	-.072	.128	-.567	.571
Hispanic	.131	.115	1.140	.255
Other	0[a]	.	.	.
Maternal Weight Gain	.011	.002	5.638	.000
Gestation Centered	.228	.015	15.476	.000
Gestation Centered Squared	-.009	.001	-6.072	.000
Mother's age	.018	.005	3.517	.000
Month Prenatal Care Began	.037	.017	2.10	.036

Interpret each of the coefficients.

All variables in the model have p-values below .05.

The Intercept: the average birthweight of an infant is 5.842 pounds, if that infant is male; has a mother who smoked, is of "Other" race, who gained no weight during pregnancy, whose gestation lasted 38.67 weeks, and whose prenatal care began one month before pregnancy. Since that last criterion isn't possible—prenatal care can't begin until month=1—this isn't a meaningful value.

Female Infant: on average, female infants weigh about 1/3 of a pound less than male infants, holding all other effects constant.

Cigarettes No: Non-smoking mothers have babies who weigh, on average, half a pound more, holding all other effects constant.

White: On average, White mothers have babies who weigh about ¼ pounds more than "other race" mothers, holding all other effects constant.

Black: On average, Black mothers have babies who weigh about .07 pounds less than "other race" mothers, holding all other effects constant. This effect is not significantly different than 0.

Hispanic: On average, Hispanic mothers have babies who weigh about .13 pounds more than "other race" mothers, holding all other effects constant. This effect is not significantly different than 0.

Maternal Weight gain: For each additional pound gained by the mother during pregnancy, the baby weighs .011 pounds more.

Gestation: The linear trend for gestation is upward. In general, each additional week of gestation is associated with a weight increase of just under a quarter pound. However, there is also a negative quadratic effect of gestation, which indicates that the effect of gestation is stronger at fewer weeks gestation, then starts to level off at higher weeks of gestation. This makes sense—the infant's growth is faster earlier on, then slows down toward birth.

Mother's age: For each one year more of mother's age, their infants weigh an average of .018 pounds more, holding all other effects constant.

Month prenatal care began: The later prenatal care began, the heavier the infant at birth. Controlling for all other variables, for each month later that mothers began prenatal care, their infants weigh an average of .037 pounds more. Now this is a small but surprising effect, because in general, heavier infants are healthier, but waiting longer to get prenatal care isn't healthier. This is something I would investigate.