Answers to Exercises: Module 2

1. The following use the Witness data set.

Interpret each of the standardized coefficients from the following table:

Regression Coefficients

Dependent Variable: ACCURATE

	Unstandardized Coefficients		Standardized Coefficients		
	B	se	Beta	t	p
Intercept	-.065	.500		-.129	.897
The age of the witness in the fictitious trial (49, 69, 79, 89)	.006	.004	**.082**	1.546	.124
Perceived cognitive ability of the witness	.174	.064	**.175**	2.717	.007
Perceived honesty of the witness on a 7 point scale	.156	.071	**.130**	2.191	.030
Perceived memory of the witness on a 7 point scale	.480	.069	**.454**	6.980	.000
Amount of time participant spends with seniors at home on a 10 point scale	-.046	.025	**-.114**	-1.867	.063
Amount of time participant spends with seniors at school on a 10 point scale	.053	.025	**.125**	2.067	.040

Age of Witness: .082—For each one standard deviation difference in age of the witness, the perceived accuracy of the witness increases only .082 standard deviations. This is not significantly different from 0. Age of Witness has no apparent effect on perceived accuracy, above and beyond the effects of the other predictors.

Cognitiv: .175-- For each one standard deviation difference in perceived cognitive ability of the witness, the average perceived accuracy of the witness increases .175 standard deviations, after controlling for other predictors. This is significantly greater than 0.

Honest: .130-- For each one standard deviation difference in perceived honesty of the witness, the average perceived accuracy of the witness increases .130 standard deviations, after controlling for other predictors. This is significantly greater than 0.

Memory: .454-- For each one standard deviation difference in perceived memory of the witness, the average perceived accuracy of the witness increases by .454 standard deviation, after controlling for other predictors. This is significantly greater than 0.

Senior_H: -.114 After accounting for other predictors in the model, the perceived accuracy of the witness decreases by .114 standard deviation for each one unit increase in the amount of time a participant spends with seniors at home. This effect is only marginally significant, however, so the effect is not different from horizontal.

Senior_S: .125—For each one standard deviation difference in the time participants spend with seniors, at school, however, there is a significant .125 standard deviation positive difference in their perception of the witness's accuracy. This is true above and beyond the effects of Witness Age, Perceived Cognitive ability, Perceived Honesty, Perceived Memory, and the amount of time they spend with seniors at home.

b) What is the standardized intercept and why?

The standardized intercept is 0, because all Xs and Y have means of 0. Since the intercept is defined as the mean of Y when all Xs = 0, the mean of Y must be 0. Since it's 0 by definition, it doesn't even appear on the output.

2. In the following regression, AGE_WITN is centered at 49 and the rest of the variables are centered at their means.

How do the results change when the predictors are centered? Are the p-values different? Are the unstandardized coefficients different? Interpret any unstandardized coefficients that changed.

Regression Coefficients

Dependent Variable: ACCURATE

	Unstandardized Coefficients		Standardized Coefficients		
Variable	B	se	Beta	t	p
Intercept	**4.093**	.115		35.697	.000
The age of the witness in the fictitious trial (49, 69, 79, 89)	.006	.004	.082	1.546	.124
Perceived cognitive ability of the witness	.174	.064	.175	2.717	.007
Perceived honesty of the witness on a 7 point scale	.156	.071	.130	2.191	.030
Perceived memory of the witness on a 7 point scale	.480	.069	.454	6.980	.000
Amount of time participant spends with seniors at home on a 10 point scale	-.046	.025	-.114	-1.867	.063
Amount of time participant spends with seniors at school on a 10 point scale	.053	.025	.125	2.067	.040

Only the intercept and its p-values change. The new intercept is 4.093. That means that at the mean of all other predictors, the average perceived accuracy of a 49 year old witness is 4.093.

3. The following uses the Births data set.

This regression model regresses mother's delivery weight (del_wgt) on the number of prenatal medical visits (previs) and pre-pregnancy weight (pre_wgt). Interpret each regression coefficient.

Regression Coefficients

Dependent Variable: Mother's delivery weight

Variable	B	se	t	p
Intercept	39.644	1.966	20.160	.000
Number of prenatal visits	.340	.095	3.566	.000
Mother's pre-pregnancy weight	.914	.011	85.289	.000

The intercept is the mean delivery weight for mothers with 0 prenatal visits and a pre-pregnancy weight of 0. As it is impossible to have a pre-pregnancy weight of 0, the intercept has no meaning.

The number of prenatal visits is significantly predictive of the delivery weight. For each additional visit, mother's delivery weight is on average .34 pounds higher, holding pre-pregnancy weight constant.

Mother's pre-pregnancy weight is also significantly predictive of the delivery weight. For each additional pound of pre-pregnancy weight, mother's delivery weight is on average .914 pounds higher.

As it turns out, both pre-pregnancy weight and delivery weight are quite skewed to the right. So I reran this regression model with a natural log transformation on both pre-pregnancy weight and delivery weight. Once again, interpret each regression coefficient.

Regression Coefficients

Dependent Variable: Natural log of mother's delivery weight

Variable	B	se	t	p	*Exp(B)*
Intercept	1.272	.049	25.988	.000	*3.568*
Number of prenatal visits	.002	.001	3.806	.000	***1.002***
Natural log of Mother's pre-pregnancy weight	**.779**	.010	79.596	.000	*2.179*

To interpret these, the first thing I do is add a column to the table in which I exponentiate each coefficient. (This is easy to do in excel using the exp function). We need this for number of prenatal visits, since it is not logged.

The intercept is the mean of the log of mother's delivery weight for mothers with no prenatal visits and a log=0 of mother's pre-pregnancy weight. Since log = 0 when X = 1, that is for mothers who weighed one pound. Since this isn't possible, the intercept isn't meaningful.

The number of prenatal visits is significantly predictive of the delivery weight. For each additional visit, mother's delivery weight is on average .2% higher.

Since mother's pre-pregnancy weight is logged, we can interpret its coefficient, .779, as the following: for each 1% increase in pre-pregnancy weight, we see a .78% increase in delivery weight.