For HW4, three options:
1. Revise HW3 in line with feedback;
2. Extend HW3 in line with Lectures on Regression Models;
3. Accept HW3 grade for HW4 as well.

The selected option must be clearly indicated in an online submission responding to HW4 on Canvas no later than 7pm on Wednesday 21 March.

Quiz 4: this Thursday in class.

Predicting Attitudes toward Recreational Marijuana (Unstandardized coefficients)

	Model 1	Model 2	Model 3
(Constant)	1.762	2.208	1.440
female	-.358***	-.332***	-.335***
parent	-.134*	-.248***	-.220***
age		-.760***	.572***
Liberal5			1.286***
Adj R^2	.025	.069	.184
N =	(963)	(963)	(963)

compute interact= $(x * z)$.

	Male (0)	Female (1)
Non-Hispanic (0)	0	0
Hispanic (1)	0	1

compute FemHisp = Female*Hisp.

	(0)	(.5)	(1)
(0)	0	0	0
(.5)	0	.25	.5
(1)	0	.5	1

	(1)	(2)	(3)
(1)	1	2	3
(2)	2	4	6
(3)	3	6	9

Avoid interacting a dummy & an ordinal measure


```
*Create interaction term*.
compute fempar = (female*parent).

regression variables=RawMJ3 female parent fempar
 /statistics anova coeff r tol
 /descriptives = n
 /dependent = RawMJ3
 /method = enter female parent
 /method = enter fempar.
```

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.326	2	18.163	14.016	.000[b]
	Residual	1265.322	976	1.296		
	Total	1301.647	978			
2	Regression	36.604	3	12.201	9.408	.000[c]
	Residual	1265.044	975	1.297		
	Total	1301.647	978			

a. Dependent Variable: RawMJ3

b. Predictors: (Constant), parent, female

c. Predictors: (Constant), parent, female, fempar

Model		b	Std. Error	Beta	t	Sig.	Tol
1	(Constant)	1.756	.058		30.361	.000	
	female	-.366	.073	-.159	-5.036	.000	1.000
	parent	-.123	.076	-.051	-1.605	.109	1.000
2	(Constant)	1.769	.064		27.787	.000	
	female	-.391	.090	-.170	-4.340	.000	.653
	parent	-.158	.108	-.065	-1.459	.145	.496
	fempar	.071	.153	.023	.463	.643	.391

RawMJ3 = Constant + female + parent + fempar

With dichotomous variables for female and parent we have 2X2 or four possible versions of the equation.

```
                                    constant + female + parent + fempar
RawMJ3 (Female & Parent)    =    1.769 – .391(1) - .158(1) - .071(1)    =  1.149
RawMJ3 (Female & nonParent) =    1.769. - .391(1) - .158 (0) -.071(0)    = 1.378
RawMJ3 (Male & Parent)      =    1.769 - .391(0) - . 158(1) - .071(0)   = 1.611
RawMJ3 (Male & nonParent) =    1.769 - .391(0) - .158(0) -.071(0)    = 1.769
```

Support for Recreational Marijuana by Gender and Parenthood
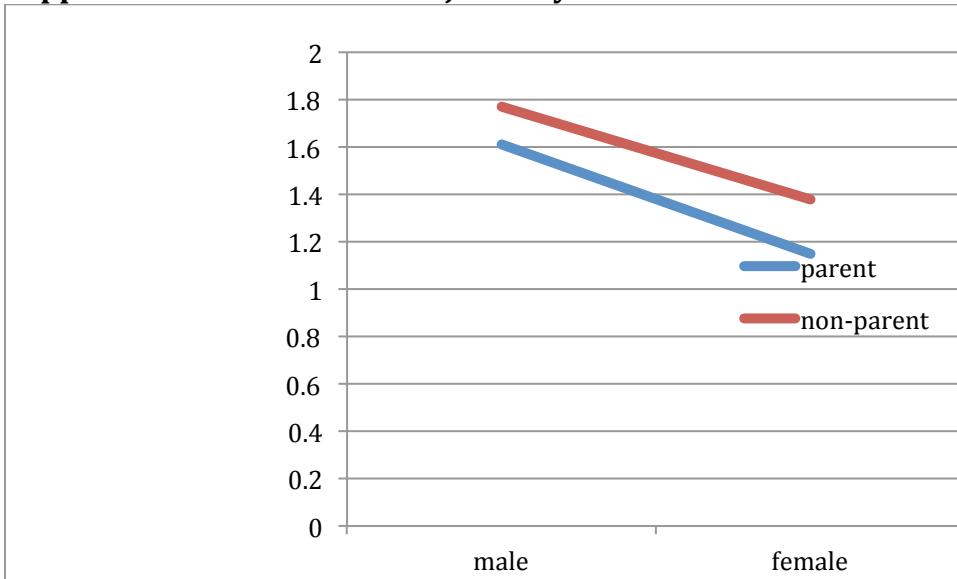
Source PPIC October 2016

```
*create interaction terms*.
compute femhisp = (female * hisp).

regression variables=RawMJ3 female hisp femhisp
  /statistics anova coeff r tol
  /descriptives = n
  /dependent = RawMJ3
  /method = enter female hisp
  /method = enter femhisp.
```

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.216[a]	.047	.045	1.12824
2	.218[b]	.047	.045	1.12828

a. Predictors: (Constant), Hisp, female
b. Predictors: (Constant), Hisp, female, femhisp

Model		b	Std. Error	Beta	t	Sig.	Tol
1	(Constant)	1.770	.053		33.548	.000	
	female	-.312	.072	-.135	-4.345	.000	.991
	Hisp	-.438	.088	-.156	-4.996	.000	.991
2	(Constant)	1.753	.056		31.539	.000	
	female	-.276	.081	-.120	-3.419	.001	.784
	Hisp	-.341	.133	-.121	-2.575	.010	.433
	femhisp	-.171	.177	-.049	-.970	.332	.373

RawMJ3 = Constant + female + hisp + femhisp

		constant + female + hisp + femhisp		
RawMJ3 (Female & Hisp)	=	1.753 – .276(1) - .341(1) - .171(1)	=	.965
RawMJ3 (Female & nonHisp)	=	1.753. - .276(1) - .341 (0) -.171(0)	=	1.477
RawMJ3 (Male & Hisp)	=	1.753 - .276(0) - .341(1) - .171(0)	=	1.412
RawMJ3 (Male & nonHisp)	=	1.753 - .276(0) - .341(0) -.171(0)	=	1.753

Support for Recreational Marijuana by Ethnicity and Gender
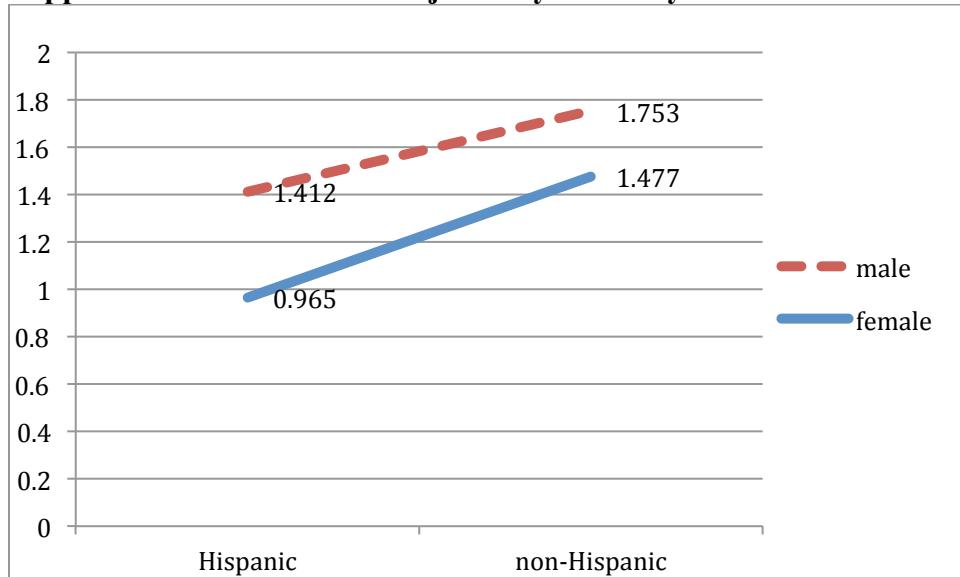
Source: PPIC October 2016

Support for Recreational Marijuana by Gender and Ethnicity
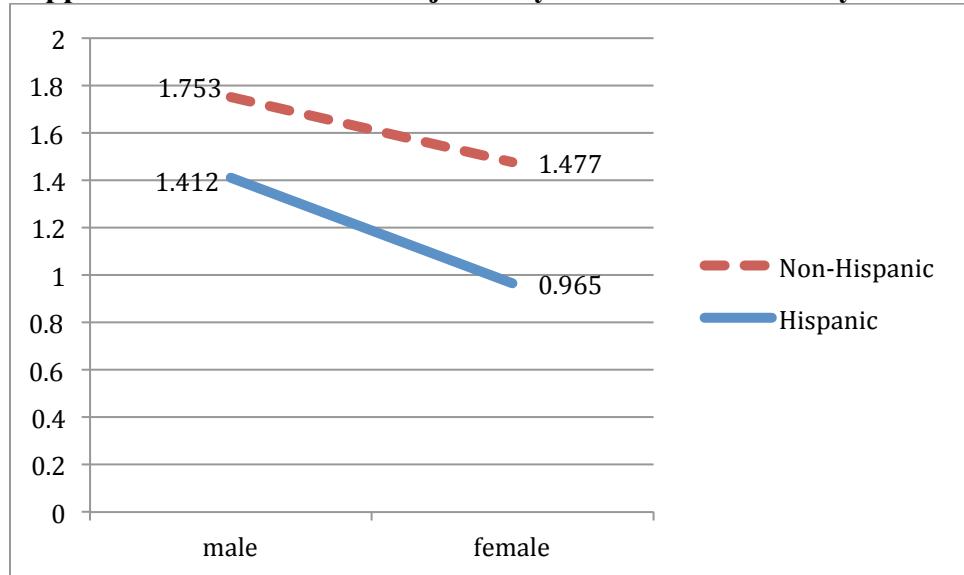
Source: PPIC October 2016

```
compute libint = (liberal5 * interest).
regression variables=RawMJ3 liberal5 interest libint
 /statistics anova coeff r tol
 /descriptives = n
 /dependent = RawMJ3
 /method = enter liberal5 interest
 /method = enter libint.
```

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.386[a]	.149	.147	1.06531
2	.397[b]	.158	.155	1.06050

a. Predictors: (Constant), interest, liberal5
b. Predictors: (Constant), interest, liberal5, libint

Model		b	Std. Error	Beta	t	Sig.	Tol
1	(Constant)	.440	.107		4.130	.000	
	liberal5	1.371	.111	.366	12.392	.000	.998
	interest	.572	.121	.139	4.711	.000	.998
2	(Constant)	.890	.178		4.998	.000	
	liberal5	.510	.295	.136	1.731	.084	.139
	interest	-.045	.230	-.011	-.194	.846	.275
	libint	1.191	.379	.285	3.145	.002	.105

Support for Recreational Marijuana by Ideology and Interest
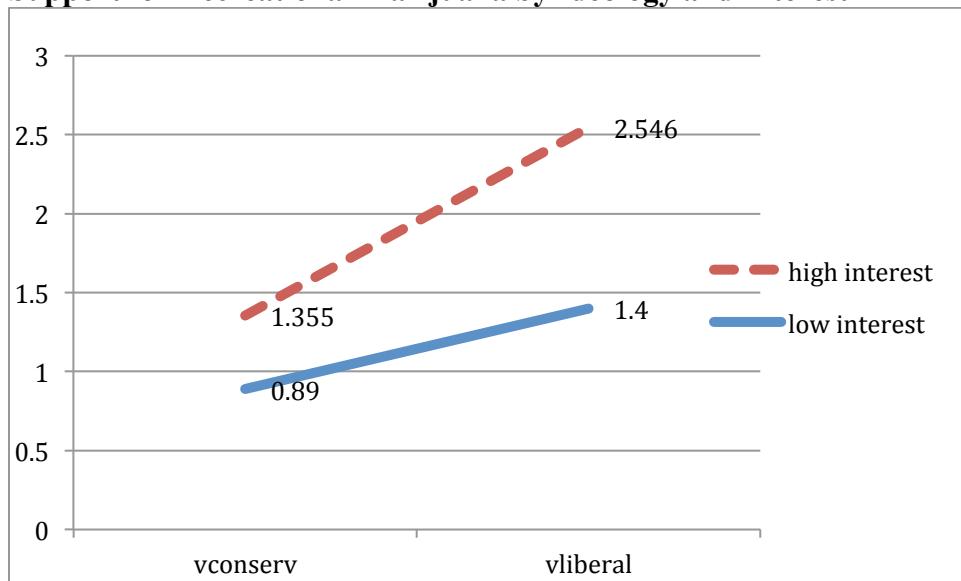
Source: PPIC October 2016

Predicting Attitudes toward Recreational Marijuana
**(Unstandardized coefficients)**

	Model 1	Model 2	Model 3	Model 4	Model 5
(Constant)	1.756	2.208	1.440	1.107	1.432
female	-.358***	-.332***	-.335***	-.292***	-.239***
parent	-.134	-.248**	-.220**	-.211**	-.198**
age		-.760***	-.572***	-.647***	-.669***
liberal5			1.286***	1.292***	.475
interest				.678***	.096
lib*int					1.136**
Adj R^2	.025	.069	.184	.209	.216
N =	(963)	(963)	(963)	(962)	(962)

*Signif <.05; **Signif <.01; ***Signif <.001

Predicting Attitudes toward Recreational Marijuana
(Unstandardized coefficients)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
(Constant)	1.756	2.208	1.440	1.107	1.432	1.311
female	-.358***	-.332***	-.335***	-.292***	-.239***	-.273***
parent	-.134	-.248**	-.220**	-.211**	-.198**	-.178***
age		-.760***	-.572***	-.647***	-.669***	-.114
liberal5			1.286***	1.292***	.475	.360
interest				.678***	.096	.593*
lib*int					1.136**	.953***
age*int						-.940***
Hisp						-.499***
Black						.006
Asian						-.357**
high school						.396**
college						.321**
grad						.273*
post grad						.271
RepID						-.518***
DemID						-.170*
Adj R^2	.025	.069	.184	.209	.216	.282
N =	(963)	(963)	(963)	(962)	(962)	(962)

Complete Specification

X1

X2

X1*X2

Y
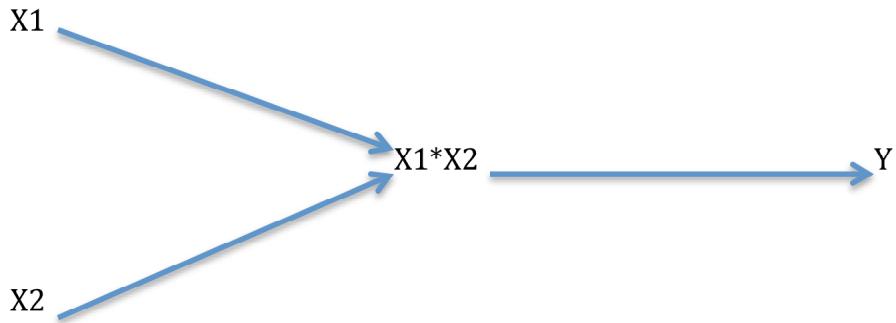
Partial Specification

X1

X2

X1*X2

Y
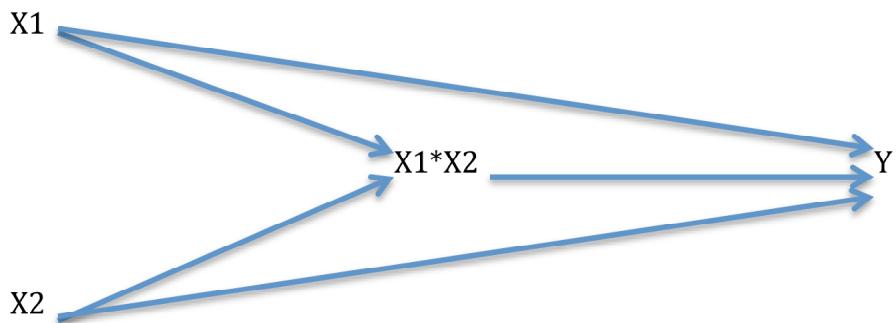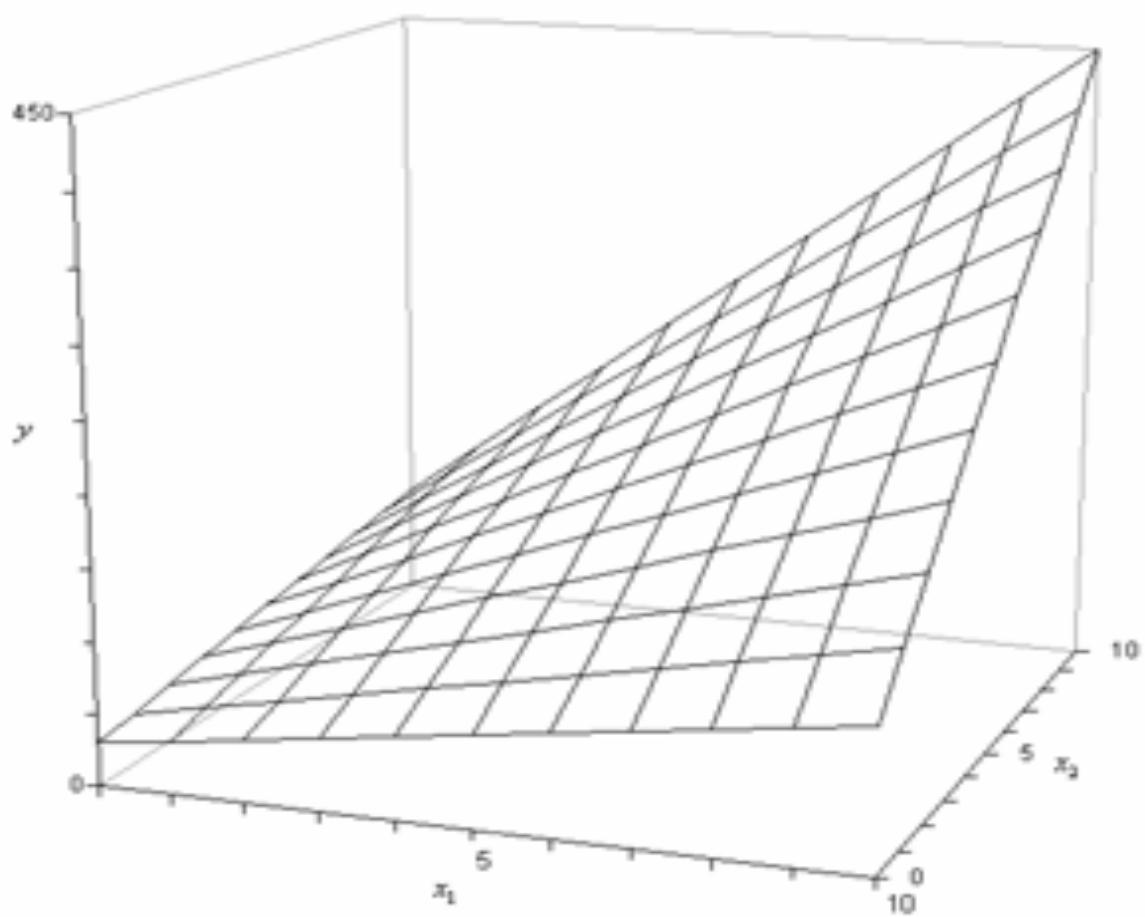
In other words, an interactive model fits a "warped" regression plane, and the multiplicative interaction term describes the amount of the warp.

All sorts of warping is possible.

Go to York site (link in lab on interpreting interactions).
http://www.math.yorku.ca/SCS/spida/lm/visreg.html