Exercise 1 Data Description

Average and dispersion in product characteristics (price)

Market share (choice frequency) and market share by product characteristics

	marketshare <dbl></dbl>
PPk_Stk	176.6
PBB_Stk	69.9
PFI_Stk	24.3
PHse_Stk	59.3
PGen_Stk	31.5
Plmp_Stk	7.4
PSS_Tub	31.9
PPk_Tub	20.3
PFI_Tub	22.5
PHse_Tub	3.3

1-10 of 10 rows

Illustrate the mapping between observed attributes and choices

\$	hhid ‡	choice ^	Income ‡	Fs3_4 [‡]	Fs5.	Fam_Size	college [‡]	whtcollar [‡]	retired
109	2101378	1	12.5	0	1 1	5	0	1	0
111	2101378	1	12.5	0	1	5	0	1	0
115	2101378	1	12.5	0	1	5	0	1	0
117	2101378	1	12.5	0	1	5	0	1	0
118	2101378	1	12.5	0	1	5	0	1	0
198	2102152	1	12.5	0	1	5	0	0	0
199	2102152	1	12.5	0	1	5	0	0	0
200	2102152	1	12.5	0	1	5	0	0	0
201	2102152	1	12.5	0	1	5	0	0	0
202	2102152	1	12.5	0	1	5	0	0	0
203	2102152	1	12.5	0	1	5	0	0	0
289	2103721	1	12.5	0	0	2	1	1	0
290	2103721	1	12.5	0	0	2	1	1	0
291	2103721	1	12.5	0	0	2	1	1	0
372	2104455	1	12.5	1	0	4	1	1	0
436	2106195	1	12.5	1	0	3	0	1	0
437	2106195	1	12.5	1	0	3	0	1	0
438	2106195	1	12.5	1	0	3	0	1	0
439	2106195	1	12.5	1	0	3	0	1	0
441	2106195	1	12.5	1	0	3	0	1	0
499	2106567	1	12.5	0	0	2	0	0	1
500	2106567	1	12.5	0	0	2	0	0	1
561	2107698	1	12.5	0	0	2	0	1	0

It shows that people with higher income will choose brand with higher price.

Exercise 2 First Model

Propose a model specifification

We can use Conditional logit model.

Interpret the coeffifficient on price

```
[1] -0.9543113 1.2969413 -1.7173310 -2.9039724 -1.5152702 0.2517523 1.4648614 [8] 2.3574933 -3.8966146 -6.6565577
```

The first through ninth terms are intercepts.

-6.65 means that if brand's price increases, the demand of this brand will decrease.

Exercise 3 Second Model

Propose a model specifification.

We can use Multinomial logit model.

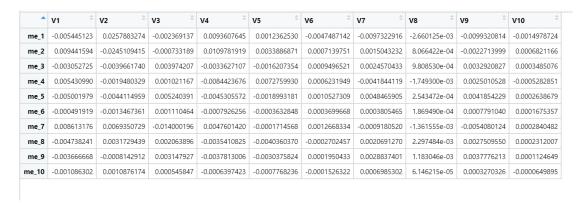
Interpret the coeffiffificient on family

 $-0.84 \sim -4.279$ are intercepts.

-0.003 $^{\sim}$ 0.0107 , -0.003 means that if income increases, the demand of the first choice will decrease. Same thing with other numbers.

Exercise 4 Marginal Effffects

(1)



For each x in the single box, it means that one unit increase in product V's price will increase x in the probability to buy the product V. For example, in the single box of V1-me_1, -0.005445123 means one unit increase in product 1's price will decrease 0.005445123 in the probability to buy the product 1.

(II)

```
[,1]
[1,] -0.0010504137
[2,] -0.0009016311
[3,] 0.0006266867
[4,] 0.0001660472
[5,] -0.0002794477
[6,] 0.0004431356
[7,] -0.0006821378
[8,] 0.0008861440
[9,] 0.0007338590
[10,] 0.0000577577
```

-0.0010504 means that one unit change increase in income will decrease 0.0010504 in the probability of choosing the first choice. Same thing with other numbers.

Exercise 5 IIA

Denote by Bithe estimated coeffiffificients

```
[1] -6.65969884 -0.004333800 0.014258958 0.004025557 -0.001264787 0.029710007 -0.009327126 0.021914644 [9] 0.016902350 0.008674428 -0.838705945 0.891148169 -1.826370582 -2.871247434 -2.454001559 0.498968897 [17] 0.805453868 1.866785193 -4.140083624
```

Denote by β_r the estimated parameters

```
[1] 2.059202266 0.016721323 0.006614508 0.001215756 0.032891379 -0.003689518 0.025468878 0.020231747 [9] 0.012479752 -1.470467400 -1.261403167 -0.565696438 -2.812995853 -1.139907155 -2.511165831 -2.759864325 [17] -4.705006196
```