Exercise 1:

Average and dispersion:

```
##     PPk_Stk    PBB_Stk    PFl_Stk PHse_Stk  PGen_Stk PImp_Stk    PSS_Tub    PPk_Tub
## 0.5184362 0.5432103 1.0150201 0.4371477 0.3452819 0.7807785 0.8250895 1.0774094
##     PFl_Tub   PHse_Tub
## 1.1893758 0.5686734
```

```
##        PPk_Stk        PBB_Stk        PFl_Stk       PHse_Stk        PGen_Stk        PImp_Stk
## 0.0022512977 0.0017998109 0.0006415859 0.0017773659 0.0005259808 0.0017147682
##        PSS_Tub        PPk_Tub        PFl_Tub       PHse_Tub
## 0.0009155455 0.0004446156 0.0002102142 0.0010837139
```

```
##            mean  min  max    sd   var
## PPk_Stk   0.518 0.19 0.67 0.151 0.023
## PBB_Stk   0.543 0.19 1.01 0.120 0.014
## PFl_Stk   1.015 0.95 1.16 0.043 0.002
## PHse_Stk 0.437 0.19 0.64 0.119 0.014
## PGen_Stk 0.345 0.25 0.55 0.035 0.001
## PImp_Stk 0.781 0.33 2.30 0.115 0.013
## PSS_Tub   0.825 0.50 0.98 0.061 0.004
## PPk_Tub   1.077 0.98 1.24 0.030 0.001
## PFl_Tub   1.189 0.69 1.47 0.014 0.000
## PHse_Tub 0.569 0.33 1.27 0.072 0.005
```

Market Share:

	choice	n
1	1	8.838441e-05
2	2	3.498341e-05
3	3	1.216161e-05
4	4	2.967834e-05
5	5	1.576506e-05
6	6	3.703537e-06
7	7	1.596525e-05
8	8	1.015970e-05
9	9	1.126075e-05
10	10	1.651577e-06

Market Share by characteristics:

	choices	choices	V1
1	1	PPk_Stk	0.5184362
2	2	PBB_Stk	0.5432103

```
3           3    PFl_Stk 1.0150201
4           4 PHse_Stk 0.4371477
5           5 PGen_Stk 0.3452819
6           6 PImp_Stk 0.7807785
7           7    PSS_Tub 0.8250895
8           8    PPk_Tub 1.0774094
9           9    PFl_Tub 1.1893758
10         10 PHse_Tub 0.5686734
```

Mapping:

	choice	notcollege	notwhtcollar	notretired	famsize1_2	famsize3_4	famsize5.	college	whtcollar	retired
1	1	1205	759	1414	622	902	242	561	1007	352
2	10	18	2	29	3	12	18	15	31	4
3	2	480	319	531	261	360	78	219	380	168
4	3	133	111	114	161	62	20	110	132	129
5	4	419	242	502	177	298	118	174	351	91
6	5	229	90	269	65	187	63	86	225	46
7	6	42	32	46	33	18	23	32	42	28
8	7	216	135	272	142	157	20	103	184	47
9	8	151	87	183	70	122	11	52	116	20
10	9	163	95	144	146	68	11	62	130	81

Exercise 2:
-0.9543264   1.2969599 -1.7173741 -2.9040330 -1.5153099   0.2516940   1.4647896   2.3573682 -3.8966223 -6.6565265
the price has a negative impact on the probability of getting chosen by customers

Exercise 3:
-0.003156534   0.014502403   0.003978203   -0.001326591   0.030522991   -0.007003193 0.022804588   0.017661189   0.010711328
Income will have a negative impact of getting hired for choice2, choice7, as for other choices, if the income is higher, the probability of choosing will get higher.

Exercise 4:

Marginal Effect:

```
##                 1              2              3              4              5
## -1.062467e-03 -9.035571e-04   6.442588e-04   1.849436e-04 -2.781303e-04
##                 6              7              8              9             10
##   4.131162e-04 -6.824169e-04   8.781123e-04   7.459655e-04  6.017529e-05
```

```
##                 [,1]           [,2]          [,3]          [,4]          [,5]
## [1,] -0.001050102 -0.0009015754 0.0006264986 0.0001658639 -0.0002793115
##                 [,6]           [,7]          [,8]          [,9]         [,10]
## [1,] 0.0004430249 -0.0006821461 0.0008860677 0.000733821 5.785854e-05
```

When income rises, choice1,2,5,7 will have lower prob of getting purchased. But overall, these coeffcients are small.

Exercise 5:

The estimated coefficients:

```
##   [1] -0.838765940    0.891349297 -1.826505215 -2.871274491 -2.454313591
##   [6]   0.498899430    0.805743197   1.866687349 -4.139798727 -6.659769251
## [11] -0.004332423    0.014249506   0.004024862 -0.001264060   0.029718813
## [16] -0.009321103    0.021905634   0.016902603   0.008665919
```

The estimated parameters:

```
##   [1]   1.640124061 -0.939582637 -1.965470973 -1.643520435   1.226333094
##   [6]   1.558823515   2.579653491 -3.240009390 -6.421848098   0.018279502
## [11]   0.007400108   0.002966837   0.033461182 -0.004447402   0.025834253
## [16]   0.020906619   0.012525749
```

Test statistics:

7416.69

Conclude:

IIA has been violated because the difference between log likelihood reaches 3400.