Homework

1,

Question 1-5; Question 7

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1. the number of students is: 340823
2. the number of school is: 898
3. the number of program is: 33
4. the number of choices is: 3086
5. the number of missing test score is: 179887
7. the number of student apply to less than 6 choices is: 17088
```

Question 6

Group.1 <int>	x <int>
10101	5891
10102	1958
10103	8419
10104	2474
10105	1496
10106	4015
10107	4075
10108	4181
10109	9151
10110	3017

2.

	schoolcode	pregname	sssdistrict	ssslong	ssslat
1	50112	Home Economics	Kumasi Metro	-1.59718716	6.682060
2	70102	General Arts	Ho Municipal	0.52614224	6.717607
3	50702	Business	Kwabre (Mamponteng)	-1.54142010	6.806778
4	90501	Visual Arts	Kassena/Nankani (Navrongo)	-1.21744096	10.909423
5	51802	Home Economics	Sekyere East (Effiduase)	-0.84423596	7.210829
6	10102	General Arts	Accra Metropolitan	-0.19711526	5.607396
7	80301	General Arts	East Gonja (Salaga)	-0.53393960	8.729157
8	40301	General Arts	Nzema East (Axim)	-2.31180215	5.141226
9	21303	Business	East Akim (Kibi)	-0.45434421	6.178558
10	80101	General Arts	Tamale	-0.78434825	9.383351
11	100201	General Science	Lawra	-2.80094123	10.546398
12	30603	Business	Awutu/Efutu/Senya (Winneba)	-0.50863892	5.544896
13	80101	Business	Tamale	-0.78434825	9.383351
14	90301	Technical	Builsa (Sandema)	-1.33749449	10.557073
15	40903	General Arts	Wassa West (Tarkwa)	-1.98885322	5.276049
16	80102	General Arts	Tamale	-0.78434825	9.383351
17	10401	General Arts	Dangme West (Dodowa)	0.51238650	5.786251
18	60301	Agriculture	Berekum	-2.63174391	7.503565
19	100102	General Arts	Wa Municipal	-2.28503036	10.030622
20	50501	Home Economics	Sekyere West (Mampong)	-1.18007684	7.199565

schoolcode <dbl>	pregname <chr>	cutoff <int>	quality <dbl>	size <int>
0	0	NA	NA	201599
10101	Agriculture	288	310.1429	49
10101	Business	305	324.8600	100
10101	General Arts	316	330.0900	100
10101	General Science	299	329.1000	50
10101	Home Economics	284	300.5714	49
10101	Visual Arts	296	311.5400	50
10102	General Arts	388	404.9773	88
10102	General Science	389	406.4143	70
10102	Home Economics	363	377.1111	45

4.

	rankplace <int>	avg_cutoff <dbl>	sd_cutoff <dbl>	avg_quality <dbl>	sd_quality <dbl>	avg_dis <dbl>	sd_dis <dbl>
1	1	284.5812	59.705298	311.1536	52.96497	20.58506	29.06944
2	2	277.7861	51.430078	303.6828	44.73330	20.26266	28.34991
3	3	262.6396	43.985059	289.9210	37.49325	17.24223	25.69839
4	4	249.4498	38.069156	278.4302	31.91191	14.18019	23.89376
5	5	210.3753	8.185402	251.9085	12.88347	19.34335	22.08545
6	6	210.3297	8.582465	249.4862	11.20343	18.87817	21.11206
7	99	NaN	NA	NaN	NA	NaN	NA
8	NA	NaN	NA	NaN	NA	NaN	NA

8 rows

6

		se_hat
	2.48472175	0.040338560
X1	1.20739790	0.017233103
X2	-0.89818499	0.002854236
X3	0.09254053	0.021680152

7

7.1

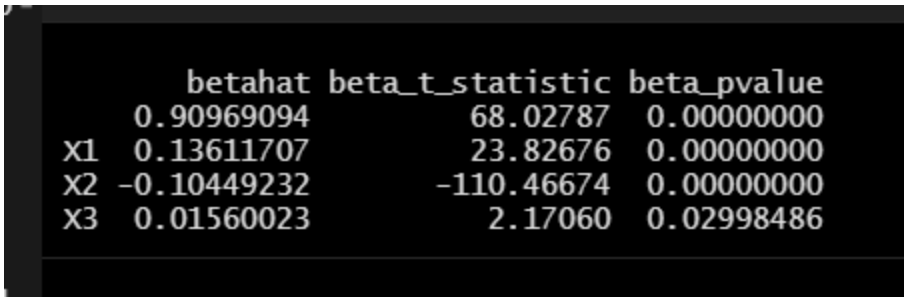
probit

	betahat	se	beta_t_statistic	beta_pvalue
[1,]	3.05436450	0.10059109	30.364165	0.0000000
[2,]	1.18143471	0.04381900	26.961699	0.0000000
[3,]	-0.90835055	0.01853528	-49.006580	0.0000000
[4,]	0.09095793	0.04714481	1.929331	0.0537181

logit

	betahat	se	beta_t_statistic	beta_pvalue
[1,]	5.5050954	0.18982896	29.000293	0.000000
[2,]	2.1207903	0.08151964	26.015697	0.000000
[3,]	-1.6363446	0.03715289	-44.043533	0.000000
[4,]	0.1758275	0.08500430	2.068454	0.038623

linear prob



	betahat	beta_t_statistic	beta_pvalue
	0.90969094	68.02787	0.00000000
X1	0.13611707	23.82676	0.00000000
X2	-0.10449232	-110.46674	0.00000000
X3	0.01560023	2.17060	0.02998486

7.2

interpre and compare estimated coeff, how sig are they?

* In the probit model, **X1** and **X2** are statistically significant, which **X3** is significant at 99% level.

+ For one unit increase in **X1**, the y increases

+ For one unit increase in **X2**, the y decreases

+ For one unit increase in **X3**, the y increases

* In the logit model, **X1** and **X2** are statistically significant, which **X3** is significant at 99% level.

+ For one unit increase in **X1**, the y increases

+ For one unit increase in **X2**, the y decreases

+ For one unit increase in **X3**, the y increases

* In the linear probability model, **X1** and **X2** are statistically significant, which **X3** is significant at 99% level.

+ For one unit increase in **X1**, the y iecreases by 13.62626 %

+ For one unit increase in **X2**, the y increases by 10.43247 %

+ For one unit increase in **X3**, the y increases by 1.56355 %

* From above results, the estimated coefficient reached by different models varies a little bit from each other. However, they are showing similar relationfor overall data.

8

marginal effect of probit

```
              [,1]         [,2]          [,3]         [,4]
 [1,] 1.158423e+00 4.480806e-01 -3.445085e-01 3.449745e-02
 [2,] 1.918651e-05 7.421381e-06 -5.705957e-06 5.713676e-07
 [3,] 2.727308e-04 1.054929e-04 -8.110859e-05 8.121831e-06
 [4,] 4.756430e-01 1.839797e-01 -1.414535e-01 1.416449e-02
 [5,] 2.231601e-13 8.631880e-14 -6.636654e-14 6.645631e-15
 [6,] 3.234016e-01 1.250924e-01 -9.617780e-02 9.630790e-03
 [7,] 1.619274e-02 6.263385e-03 -4.815628e-03 4.822142e-04
 [8,] 3.153388e-04 1.219737e-04 -9.377996e-05 9.390682e-06
 [9,] 7.523623e-01 2.910153e-01 -2.237483e-01 2.240509e-02
[10,] 4.283626e-01 1.656916e-01 -1.273926e-01 1.275649e-02
[11,] 1.874452e-01 7.250420e-02 -5.574513e-02 5.582054e-03
[12,] 2.825710e-30 1.092991e-30 -8.403501e-31 8.414869e-32
[13,] 6.864357e-01 2.655148e-01 -2.041420e-01 2.044182e-02
[14,] 7.182428e-01 2.778179e-01 -2.136013e-01 2.138903e-02
[15,] 3.409647e-06 1.318859e-06 -1.014010e-06 1.015381e-07
[16,] 9.737199e-04 3.766369e-04 -2.895787e-04 2.899705e-05
[17,] 1.036009e-05 4.007306e-06 -3.081032e-06 3.085200e-07
[18,] 1.069193e+00 4.135660e-01 -3.179718e-01 3.184019e-02
[19,] 5.416583e-03 2.095146e-03 -1.610861e-03 1.613040e-04
[20,] 5.440957e-03 2.104574e-03 -1.618110e-03 1.620298e-04
```

avg marginal effect of probit

```
[1]  0.36157351  0.13985740 -0.10752989  0.01076754
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marginal effect of logit

```
             [,1]         [,2]          [,3]         [,4]
 [1,] 1.265206e+00 4.874097e-01 -3.760722e-01 4.040948e-02
 [2,] 1.151067e-03 4.434387e-04 -3.421453e-04 3.676399e-05
 [3,] 3.376206e-03 1.300654e-03 -1.003550e-03 1.078328e-04
 [4,] 3.909771e-01 1.506206e-01 -1.162148e-01 1.248744e-02
 [5,] 5.548321e-06 2.137442e-06 -1.649193e-06 1.772081e-07
 [6,] 2.644616e-01 1.018815e-01 -7.860904e-02 8.446650e-03
 [7,] 2.775981e-02 1.069422e-02 -8.251375e-03 8.866216e-04
 [8,] 3.694262e-03 1.423182e-03 -1.098089e-03 1.179912e-04
 [9,] 6.853906e-01 2.640408e-01 -2.037268e-01 2.189072e-02
[10,] 3.545037e-01 1.365695e-01 -1.053733e-01 1.132251e-02
[11,] 1.597487e-01 6.154180e-02 -4.748399e-02 5.102220e-03
[12,] 4.012967e-09 1.545961e-09 -1.192822e-09 1.281703e-10
[13,] 6.159609e-01 2.372936e-01 -1.830893e-01 1.967320e-02
[14,] 6.436496e-01 2.479604e-01 -1.913196e-01 2.055755e-02
[15,] 6.043983e-04 2.328392e-04 -1.796524e-04 1.930390e-05
[16,] 6.144759e-03 2.367215e-03 -1.826479e-03 1.962577e-04
[17,] 9.094522e-04 3.503586e-04 -2.703272e-04 2.904703e-05
[18,] 1.130539e+00 4.355303e-01 -3.360435e-01 3.610833e-02
[19,] 1.485619e-02 5.723217e-03 -4.415880e-03 4.744924e-04
[20,] 1.451055e-02 5.590063e-03 -4.313142e-03 4.634530e-04
```

avg marginal effect of logit

```
[1]  0.36048874  0.13887516 -0.10715233  0.01151367
```

sd_probit

```
[1] 0.0303741943 0.0117488031 0.0090331118 0.0009045331
```

sd_logit

```
[1] 0.031933777 0.012302210 0.009492054 0.001019934
```