SAS Program-Homework

Obs	X1	X2	X3
1	Govt_job	formerly	2.40
2	Govt_job	formerly	2.05
3	Govt_job	formerly	1.94
4	Govt_job	formerly	2.35
5	Govt_job	formerly	1.80
6	Govt_job	formerly	1.86
7	Govt_job	formerly	1.86
8	Govt_job	formerly	1.97
9	Govt_job	formerly	2.39
10	Govt_job	formerly	2.22
11	Govt_job	formerly	1.95
12	Govt_job	formerly	2.05
13	Govt_job	formerly	2.02
14	Govt_job	formerly	2.04
15	Govt_job	formerly	1.99
16	Govt_job	formerly	1.74
17	Govt_job	formerly	1.76
18	Govt_job	formerly	1.95
19	Govt_job	formerly	1.96
20	Govt_job	formerly	2.34
21	Govt_job	formerly	1.76
22	Govt_job	formerly	2.32
23	Govt_job	formerly	1.78
24	Govt_job	formerly	1.93
25	Govt_job	formerly	1.77
26	Govt_job	formerly	2.34
27	Govt_job	formerly	2.20
28	Govt_job	formerly	1.86
29	Govt_job	formerly	1.95
30	Govt_job	formerly	1.90
31	Govt_job	formerly	1.90
32	Govt_job	formerly	2.36

33	Govt_job	formerly	2.02
34	Govt_job	formerly	1.86
35	Govt_job	formerly	2.01
36	Govt_job	formerly	2.38
37	Govt_job	formerly	1.79
38	Govt_job	formerly	1.98
39	Govt_job	formerly	1.93
40	Govt_job	formerly	1.98
41	Govt_job	formerly	2.08
42	Govt_job	formerly	2.01
43	Govt_job	formerly	1.91
44	Govt_job	formerly	2.07
45	Govt_job	formerly	1.99
46	Govt_job	formerly	2.05
47	Govt_job	formerly	1.90
48	Govt_job	formerly	1.78
49	Govt_job	formerly	2.21
50	Govt_job	formerly	1.92
51	Govt_job	never_sm	1.89
52	Govt_job	never_sm	1.81
53	Govt_job	never_sm	2.31
54	Govt_job	never_sm	1.87
55	Govt_job	never_sm	2.26
56	Govt_job	never_sm	2.33
57	Govt_job	never_sm	2.00
58	Govt_job	never_sm	1.96
59	Govt_job	never_sm	1.92
60	Govt_job	never_sm	2.06
61	Govt_job	never_sm	1.82
62	Govt_job	never_sm	1.81
63	Govt_job	never_sm	2.02
64	Govt_job	never_sm	2.09
65	Govt_job	never_sm	2.13
66	Govt_job	never_sm	1.93
67	Govt_job	never_sm	1.84

	Govt_job	never_sm	1.94
69	Govt_job	never_sm	2.08
70	Govt_job	never_sm	2.02
71	Govt_job	never_sm	2.38
72	Govt_job	never_sm	1.90
73	Govt_job	never_sm	1.86
74	Govt_job	never_sm	1.94
75	Govt_job	never_sm	1.84
76	Govt_job	never_sm	2.12
77	Govt_job	never_sm	2.11
78	Govt_job	never_sm	1.83
79	Govt_job	never_sm	2.03
80	Govt_job	never_sm	1.87
81	Govt_job	never_sm	1.97
82	Govt_job	never_sm	2.07
83	Govt_job	never_sm	1.77
84	Govt_job	never_sm	1.84
85	Govt_job	never_sm	2.06
86	Govt_job	never_sm	2.06
87	Govt_job	never_sm	2.32
88	Govt_job	never_sm	2.43
89	Govt_job	never_sm	1.75
90	Govt_job	never_sm	1.97
91	Govt_job	never_sm	2.20
92	Govt_job	never_sm	1.96
93	Govt_job	never_sm	1.85
94	Govt_job	never_sm	1.98
95	Govt_job	never_sm	2.00
96	Govt_job	never_sm	1.94
97	Govt_job	never_sm	1.92
98	Govt_job	never_sm	2.02
99	Govt_job	never_sm	2.29
100	Govt_job	never_sm	1.96
101	Govt_job	smokes	1.81
102	Govt_job	smokes	1.96

	Govt_job	smokes	1.91
104	Govt_job	smokes	1.74
105	Govt_job	smokes	1.91
106	Govt_job	smokes	2.36
107	Govt_job	smokes	1.91
108	Govt_job	smokes	2.33
109	Govt_job	smokes	2.12
110	Govt_job	smokes	2.05
111	Govt_job	smokes	1.87
112	Govt_job	smokes	2.19
113	Govt_job	smokes	2.01
114	Govt_job	smokes	2.01
115	Govt_job	smokes	1.92
116	Govt_job	smokes	1.94
117	Govt_job	smokes	1.98
118	Govt_job	smokes	2.36
119	Govt_job	smokes	2.01
120	Govt_job	smokes	1.86
121	Govt_job	smokes	1.81
122	Govt_job	smokes	2.21
123	Govt_job	smokes	1.87
124	Govt_job	smokes	1.93
125	Govt_job	smokes	1.87
126	Govt_job	smokes	1.84
127	Govt_job	smokes	2.34
128	Govt_job	smokes	1.84
129	Govt_job	smokes	1.97
130	Govt_job	smokes	2.00
131	Govt_job	smokes	1.95
132	Govt_job	smokes	1.86
133	Govt_job	smokes	1.91
134	Govt_job	smokes	2.00
135	Govt_job	smokes	2.21
136	Govt_job	smokes	2.05
137	Govt_job	smokes	1.86

	Govt_job	smokes	2.01
139	Govt_job	smokes	1.89
140	Govt_job	smokes	1.91
141	Govt_job	smokes	2.01
142	Govt_job	smokes	1.91
143	Govt_job	smokes	2.29
144	Govt_job	smokes	2.10
145	Govt_job	smokes	1.76
146	Govt_job	smokes	1.76
147	Govt_job	smokes	1.85
148	Govt_job	smokes	1.87
149	Govt_job	smokes	1.86
150	Govt_job	smokes	1.94
151	Private	formerly	1.86
152	Private	formerly	1.94
153	Private	formerly	1.81
154	Private	formerly	1.91
155	Private	formerly	1.98
156	Private	formerly	2.04
157	Private	formerly	2.03
158	Private	formerly	1.87
159	Private	formerly	1.82
160	Private	formerly	1.78
161	Private	formerly	2.08
162	Private	formerly	2.32
163	Private	formerly	2.07
164	Private	formerly	1.90
165	Private	formerly	2.07
166	Private	formerly	1.80
167	Private	formerly	2.01
168	Private	formerly	2.02
169	Private	formerly	1.84
170	Private	formerly	1.87
171	Private	formerly	1.82
172	Private	formerly	1.91

	Private	formerly	1.79
174	Private	formerly	1.95
175	Private	formerly	1.92
176	Private	formerly	1.92
177	Private	formerly	1.76
178	Private	formerly	2.27
179	Private	formerly	2.35
180	Private	formerly	1.91
181	Private	formerly	1.92
182	Private	formerly	2.06
183	Private	formerly	1.92
184	Private	formerly	2.07
185	Private	formerly	2.23
186	Private	formerly	2.10
187	Private	formerly	1.75
188	Private	formerly	1.76
189	Private	formerly	1.87
190	Private	formerly	2.34
191	Private	formerly	1.91
192	Private	formerly	1.97
193	Private	formerly	1.92
194	Private	formerly	1.87
195	Private	formerly	1.75
196	Private	formerly	2.32
197	Private	formerly	1.95
198	Private	formerly	2.36
199	Private	formerly	2.34
200	Private	formerly	1.80
201	Private	never_sm	2.04
202	Private	never_sm	1.89
203	Private	never_sm	1.98
204	Private	never_sm	1.96
205	Private	never_sm	2.13
206	Private	never_sm	1.91
207	Private	never_sm	1.85

	Private	never_sm	2.27
209	Private	never_sm	1.83
210	Private	never_sm	1.91
211	Private	never_sm	1.96
212	Private	never_sm	1.91
213	Private	never_sm	2.40
214	Private	never_sm	1.94
215	Private	never_sm	1.93
216	Private	never_sm	1.85
217	Private	never_sm	1.84
218	Private	never_sm	1.87
219	Private	never_sm	1.88
220	Private	never_sm	1.99
221	Private	never_sm	1.90
222	Private	never_sm	1.98
223	Private	never_sm	2.08
224	Private	never_sm	1.93
225	Private	never_sm	1.95
226	Private	never_sm	1.89
227	Private	never_sm	2.00
228	Private	never_sm	1.89
229	Private	never_sm	2.31
230	Private	never_sm	2.09
231	Private	never_sm	2.03
232	Private	never_sm	1.75
233	Private	never_sm	1.96
234	Private	never_sm	2.08
235	Private	never_sm	1.97
236	Private	never_sm	1.95
237	Private	never_sm	2.05
238	Private	never_sm	1.84
239	Private	never_sm	1.82
240	Private	never_sm	1.89
241	Private	never_sm	1.99
242	Private	never_sm	1.93

	Private	never_sm	1.97
244	Private	never_sm	1.92
245	Private	never_sm	2.03
246	Private	never_sm	1.97
247	Private	never_sm	1.81
248	Private	never_sm	1.81
249	Private	never_sm	2.03
250	Private	never_sm	1.99
251	Private	smokes	1.85
252	Private	smokes	1.97
253	Private	smokes	2.41
254	Private	smokes	1.99
255	Private	smokes	2.34
256	Private	smokes	1.81
257	Private	smokes	2.12
258	Private	smokes	2.03
259	Private	smokes	1.94
260	Private	smokes	1.93
261	Private	smokes	1.80
262	Private	smokes	1.77
263	Private	smokes	2.38
264	Private	smokes	1.90
265	Private	smokes	1.97
266	Private	smokes	2.32
267	Private	smokes	1.88
268	Private	smokes	1.89
269	Private	smokes	2.09
270	Private	smokes	2.04
271	Private	smokes	1.98
272	Private	smokes	2.16
273	Private	smokes	1.76
274	Private	smokes	2.02
275	Private	smokes	2.31
276	Private	smokes	1.99
277	Private	smokes	2.28

	Private	smokes	1.91
279	Private	smokes	1.96
280	Private	smokes	1.79
281	Private	smokes	2.00
282	Private	smokes	1.91
283	Private	smokes	1.92
284	Private	smokes	2.15
285	Private	smokes	2.07
286	Private	smokes	2.01
287	Private	smokes	2.04
288	Private	smokes	1.98
289	Private	smokes	2.16
290	Private	smokes	1.78
291	Private	smokes	1.95
292	Private	smokes	1.78
293	Private	smokes	2.01
294	Private	smokes	1.76
295	Private	smokes	2.06
296	Private	smokes	2.05
297	Private	smokes	1.78
298	Private	smokes	1.90
299	Private	smokes	1.94
300	Private	smokes	2.07
301	Self-emp	formerly	2.29
302	Self-emp	formerly	1.95
303	Self-emp	formerly	1.93
304	Self-emp	formerly	2.40
305	Self-emp	formerly	1.75
306	Self-emp	formerly	1.93
307	Self-emp	formerly	1.84
308	Self-emp	formerly	2.37
309	Self-emp	formerly	2.32
310	Self-emp	formerly	1.85
311	Self-emp	formerly	2.32
312	Self-emp	formerly	1.78

	Self-emp	formerly	1.98
314	Self-emp	formerly	2.01
315	Self-emp	formerly	1.85
316	Self-emp	formerly	2.32
317	Self-emp	formerly	2.02
318	Self-emp	formerly	2.01
319	Self-emp	formerly	1.90
320	Self-emp	formerly	1.94
321	Self-emp	formerly	1.94
322	Self-emp	formerly	2.33
323	Self-emp	formerly	1.91
324	Self-emp	formerly	2.36
325	Self-emp	formerly	2.05
326	Self-emp	formerly	2.23
327	Self-emp	formerly	1.85
328	Self-emp	formerly	2.42
329	Self-emp	formerly	1.94
330	Self-emp	formerly	1.95
331	Self-emp	formerly	2.32
332	Self-emp	formerly	2.01
333	Self-emp	formerly	1.98
334	Self-emp	formerly	1.90
335	Self-emp	formerly	2.02
336	Self-emp	formerly	1.75
337	Self-emp	formerly	2.00
338	Self-emp	formerly	2.05
339	Self-emp	formerly	2.31
340	Self-emp	formerly	2.05
341	Self-emp	formerly	2.27
342	Self-emp	formerly	2.06
343	Self-emp	formerly	1.91
344	Self-emp	formerly	1.92
345	Self-emp	formerly	1.90
346	Self-emp	formerly	2.26
347	Self-emp	formerly	2.08

	Self-emp	formerly	2.06
349	Self-emp	formerly	1.89
350	Self-emp	formerly	2.03
351	Self-emp	never_sm	1.95
352	Self-emp	never_sm	1.92
353	Self-emp	never_sm	1.93
354	Self-emp	never_sm	1.98
355	Self-emp	never_sm	1.88
356	Self-emp	never_sm	2.11
357	Self-emp	never_sm	2.26
358	Self-emp	never_sm	2.03
359	Self-emp	never_sm	1.82
360	Self-emp	never_sm	2.05
361	Self-emp	never_sm	2.32
362	Self-emp	never_sm	1.93
363	Self-emp	never_sm	2.03
364	Self-emp	never_sm	2.18
365	Self-emp	never_sm	1.91
366	Self-emp	never_sm	2.28
367	Self-emp	never_sm	2.04
368	Self-emp	never_sm	1.92
369	Self-emp	never_sm	1.93
370	Self-emp	never_sm	2.31
371	Self-emp	never_sm	1.81
372	Self-emp	never_sm	1.86
373	Self-emp	never_sm	1.87
374	Self-emp	never_sm	1.96
375	Self-emp	never_sm	2.32
376	Self-emp	never_sm	1.89
377	Self-emp	never_sm	2.28
378	Self-emp	never_sm	2.02
379	Self-emp	never_sm	1.78
380	Self-emp	never_sm	2.33
381	Self-emp	never_sm	2.31
382	Self-emp	never_sm	1.76

	Self-emp	never_sm	1.98
384	Self-emp	never_sm	1.77
385	Self-emp	never_sm	1.97
386	Self-emp	never_sm	1.85
387	Self-emp	never_sm	2.19
388	Self-emp	never_sm	1.90
389	Self-emp	never_sm	2.05
390	Self-emp	never_sm	2.06
391	Self-emp	never_sm	2.28
392	Self-emp	never_sm	2.36
393	Self-emp	never_sm	2.24
394	Self-emp	never_sm	2.15
395	Self-emp	never_sm	1.87
396	Self-emp	never_sm	1.84
397	Self-emp	never_sm	2.29
398	Self-emp	never_sm	1.84
399	Self-emp	never_sm	1.85
400	Self-emp	never_sm	2.29
401	Self-emp	smokes	2.12
402	Self-emp	smokes	2.10
403	Self-emp	smokes	2.32
404	Self-emp	smokes	2.34
405	Self-emp	smokes	2.06
406	Self-emp	smokes	1.87
407	Self-emp	smokes	2.04
408	Self-emp	smokes	1.97
409	Self-emp	smokes	2.15
410	Self-emp	smokes	1.94
411	Self-emp	smokes	1.86
412	Self-emp	smokes	1.83
413	Self-emp	smokes	1.93
414	Self-emp	smokes	2.21
415	Self-emp	smokes	2.32
416	Self-emp	smokes	2.03
417	Self-emp	smokes	1.84

	Self-emp	smokes	2.11
419	Self-emp	smokes	2.13
420	Self-emp	smokes	1.83
421	Self-emp	smokes	2.40
422	Self-emp	smokes	1.92
423	Self-emp	smokes	2.36
424	Self-emp	smokes	1.92
425	Self-emp	smokes	1.98
426	Self-emp	smokes	2.02
427	Self-emp	smokes	1.98
428	Self-emp	smokes	1.93
429	Self-emp	smokes	1.99
430	Self-emp	smokes	1.93
431	Self-emp	smokes	2.00
432	Self-emp	smokes	1.97
433	Self-emp	smokes	1.88
434	Self-emp	smokes	1.82
435	Self-emp	smokes	1.85
436	Self-emp	smokes	1.80
437	Self-emp	smokes	2.30
438	Self-emp	smokes	2.38
439	Self-emp	smokes	2.06
440	Self-emp	smokes	1.96
441	Self-emp	smokes	2.15
442	Self-emp	smokes	1.74
443	Self-emp	smokes	1.88
444	Self-emp	smokes	2.09
445	Self-emp	smokes	1.78
446	Self-emp	smokes	2.29
447	Self-emp	smokes	2.01
448	Self-emp	smokes	1.83
449	Self-emp	smokes	2.39
450	Self-emp	smokes	1.97

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

Moments			
N	450	Sum Weights	450
Mean	2.00571111	Sum Observations	902.57
Std Deviation	0.17283579	Variance	0.02987221
Skewness	0.78098587	Kurtosis	-0.284041
Uncorrected SS	1823.7073	Corrected SS	13.4126224
Coeff Variation	8.61718266	Std Error Mean	0.00814756

Basic Statistical Measures			
Location		Variability	
Mean	2.005711	Std Deviation	0.17284
Median	1.970000	Variance	0.02987
Mode	1.910000	Range	0.69000
		Interquartile Range	0.19000

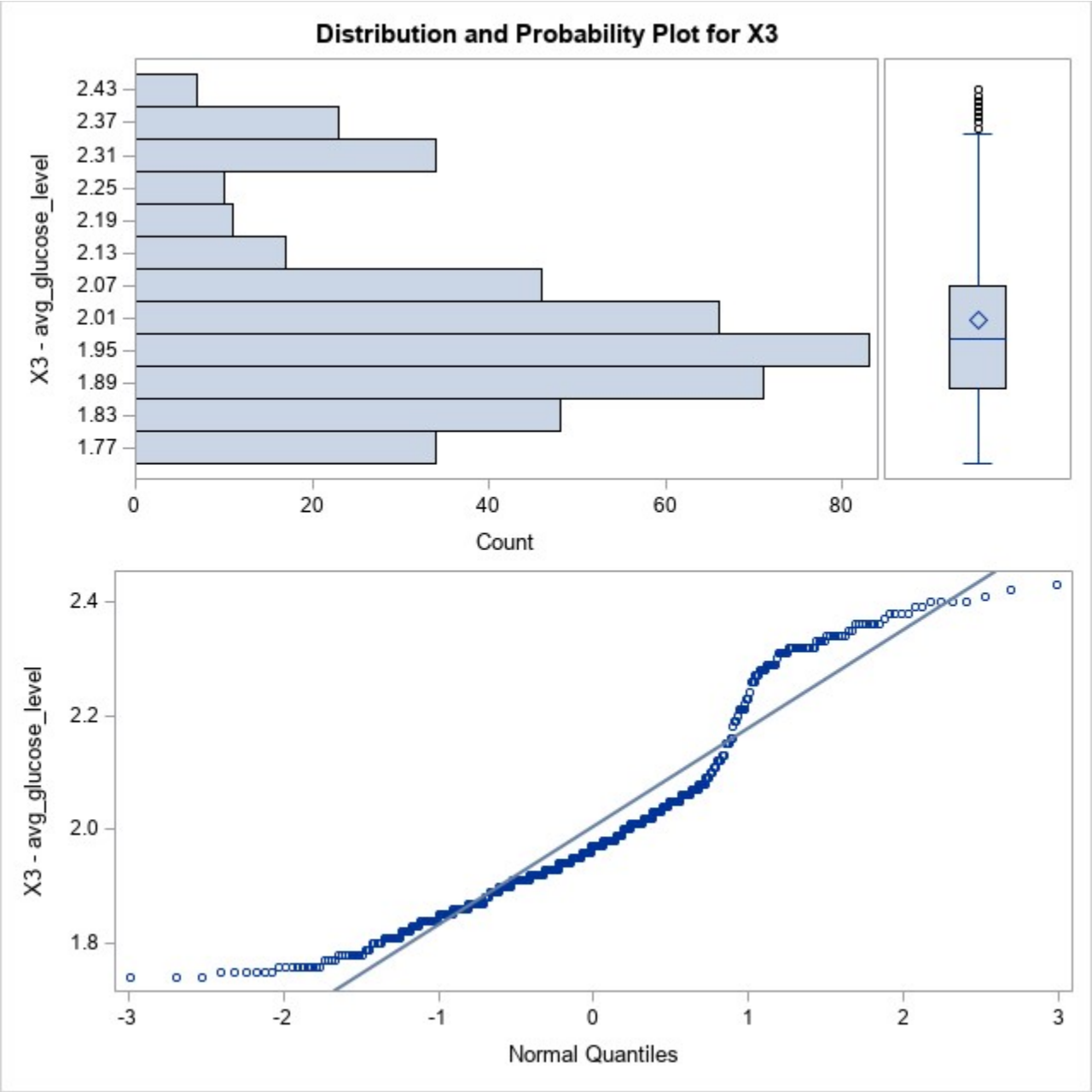
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	246.1733	Pr > |t|	<.0001
Sign	M	225	Pr >= |M|	<.0001
Signed Rank	S	50737.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.919128	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.116906	Pr > D	<0.0100
Cramer-von Mises	W-Sq	1.980115	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	12.48738	Pr > A-Sq	<0.0050

Quantiles (Definition 5)	
Level	Quantile
100% Max	2.43
99%	2.40

95%	2.35
90%	2.32
75% Q3	2.07
50% Median	1.97
25% Q1	1.88
10%	1.81
5%	1.78
1%	1.75
0% Min	1.74

Extreme Observations			
Lowest		**Highest**	
Value	**Obs**	**Value**	**Obs**
1.74	442	2.40	304
1.74	104	2.40	421
1.74	16	2.41	253
1.75	336	2.42	328
1.75	305	2.43	88


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.43
2.37
2.31
2.25
2.19
2.13
2.07
2.01
1.95
1.89
1.83
1.77
0
20
40
60
80
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

X1 - work_status=Govt_job

Moments			
N	150	Sum Weights	150
Mean	1.99893333	Sum Observations	299.84
Std Deviation	0.17193001	Variance	0.02955993
Skewness	0.86247264	Kurtosis	-0.0419111
Uncorrected SS	603.7646	Corrected SS	4.40442933
Coeff Variation	8.60108776	Std Error Mean	0.01403803

Basic Statistical Measures			
Location		Variability	
Mean	1.998933	Std Deviation	0.17193
Median	1.960000	Variance	0.02956
Mode	1.860000	Range	0.69000
		Interquartile Range	0.19000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	142.3942	Pr > |t|	<.0001
Sign	M	75	Pr >= |M|	<.0001
Signed Rank	S	5662.5	Pr >= |S|	<.0001

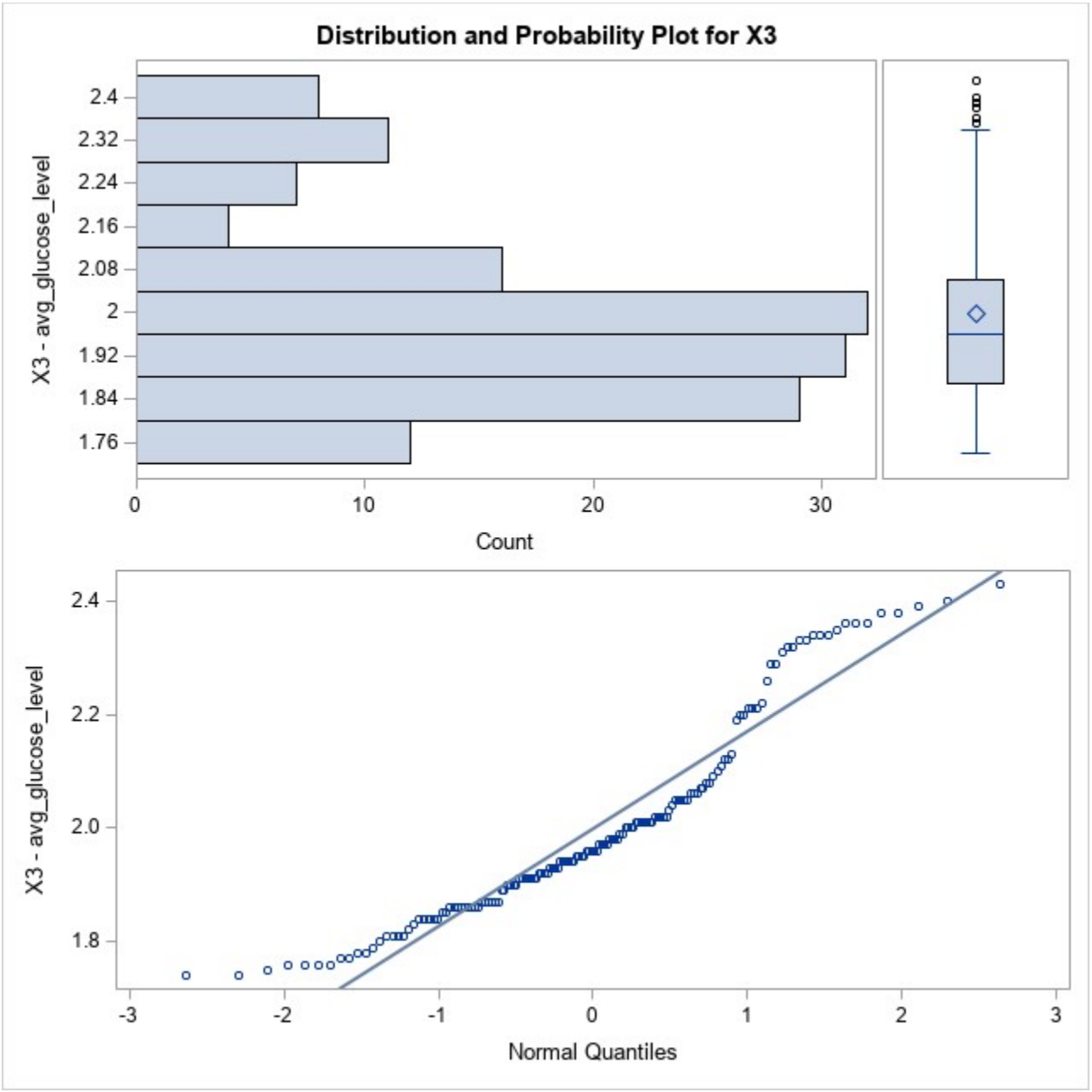
Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.91478	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.137906	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.678922	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	4.290016	Pr > A-Sq	<0.0050

Quantiles (Definition 5)	
Level	Quantile
100% Max	2.43

99%	2.40
95%	2.36
90%	2.32
75% Q3	2.06
50% Median	1.96
25% Q1	1.87
10%	1.81
5%	1.77
1%	1.74
0% Min	1.74

Extreme Observations

Lowest			Highest		
Value	**X1**	**Obs**	**Value**	**X1**	**Obs**
1.74	Govt_job	104	2.38	Govt_job	36
1.74	Govt_job	16	2.38	Govt_job	71
1.75	Govt_job	89	2.39	Govt_job	9
1.76	Govt_job	146	2.40	Govt_job	1
1.76	Govt_job	145	2.43	Govt_job	88


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.4
2.32
2.24
2.16
2.08
2
1.92
1.84
1.76
0
10
20
30
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

X1 - work_status=Private

Moments			
N	150	Sum Weights	150
Mean	1.97926667	Sum Observations	296.89
Std Deviation	0.15719477	Variance	0.0247102
Skewness	0.99156135	Kurtosis	0.59289675
Uncorrected SS	591.3063	Corrected SS	3.68181933
Coeff Variation	7.94207149	Std Error Mean	0.0128349

Basic Statistical Measures			
Location		Variability	
Mean	1.979267	Std Deviation	0.15719
Median	1.950000	Variance	0.02471
Mode	1.910000	Range	0.66000
		Interquartile Range	0.16000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	154.2098	Pr > |t|	<.0001
Sign	M	75	Pr >= |M|	<.0001
Signed Rank	S	5662.5	Pr >= |S|	<.0001

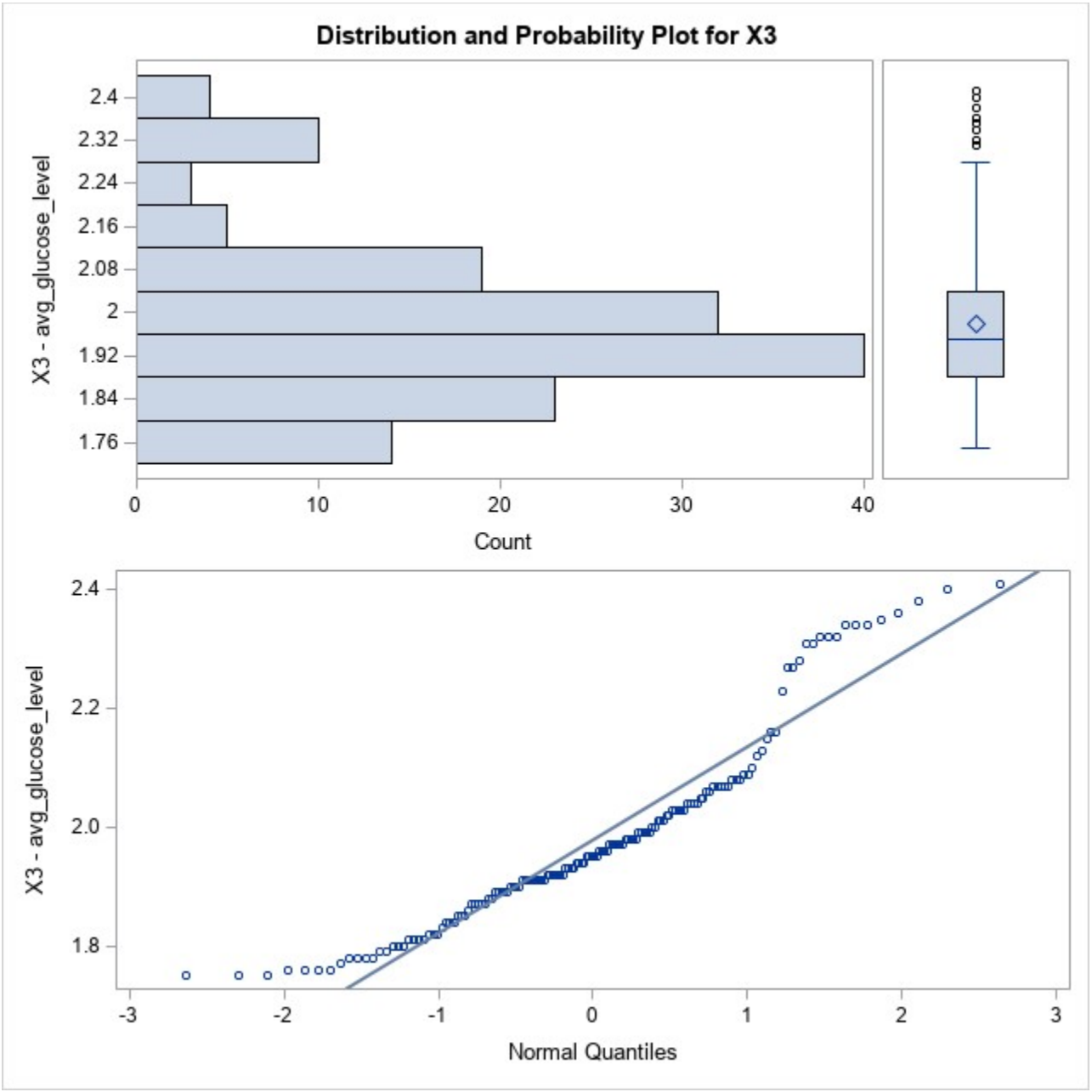
Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.913094	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.119448	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.548859	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	3.803543	Pr > A-Sq	<0.0050

Quantiles (Definition 5)	
Level	Quantile
100% Max	2.41

99%	2.40
95%	2.34
90%	2.27
75% Q3	2.04
50% Median	1.95
25% Q1	1.88
10%	1.80
5%	1.77
1%	1.75
0% Min	1.75

Extreme Observations

Lowest			Highest		
Value	**X1**	**Obs**	**Value**	**X1**	**Obs**
1.75	Private	232	2.35	Private	179
1.75	Private	195	2.36	Private	198
1.75	Private	187	2.38	Private	263
1.76	Private	294	2.40	Private	213
1.76	Private	273	2.41	Private	253


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.4
2.32
2.24
2.16
2.08
2
1.92
1.84
1.76
0
10
20
30
40
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

X1 - work_status=Self-emp

Moments			
N	150	Sum Weights	150
Mean	2.03893333	Sum Observations	305.84
Std Deviation	0.18408178	Variance	0.0338861
Skewness	0.50983395	Kurtosis	-0.9337329
Uncorrected SS	628.6364	Corrected SS	5.04902933
Coeff Variation	9.02833752	Std Error Mean	0.01503021

Basic Statistical Measures			
Location		Variability	
Mean	2.038933	Std Deviation	0.18408
Median	1.995000	Variance	0.03389
Mode	1.930000	Range	0.68000
		Interquartile Range	0.29000

Note: The mode displayed is the smallest of 2 modes with a count of 8.

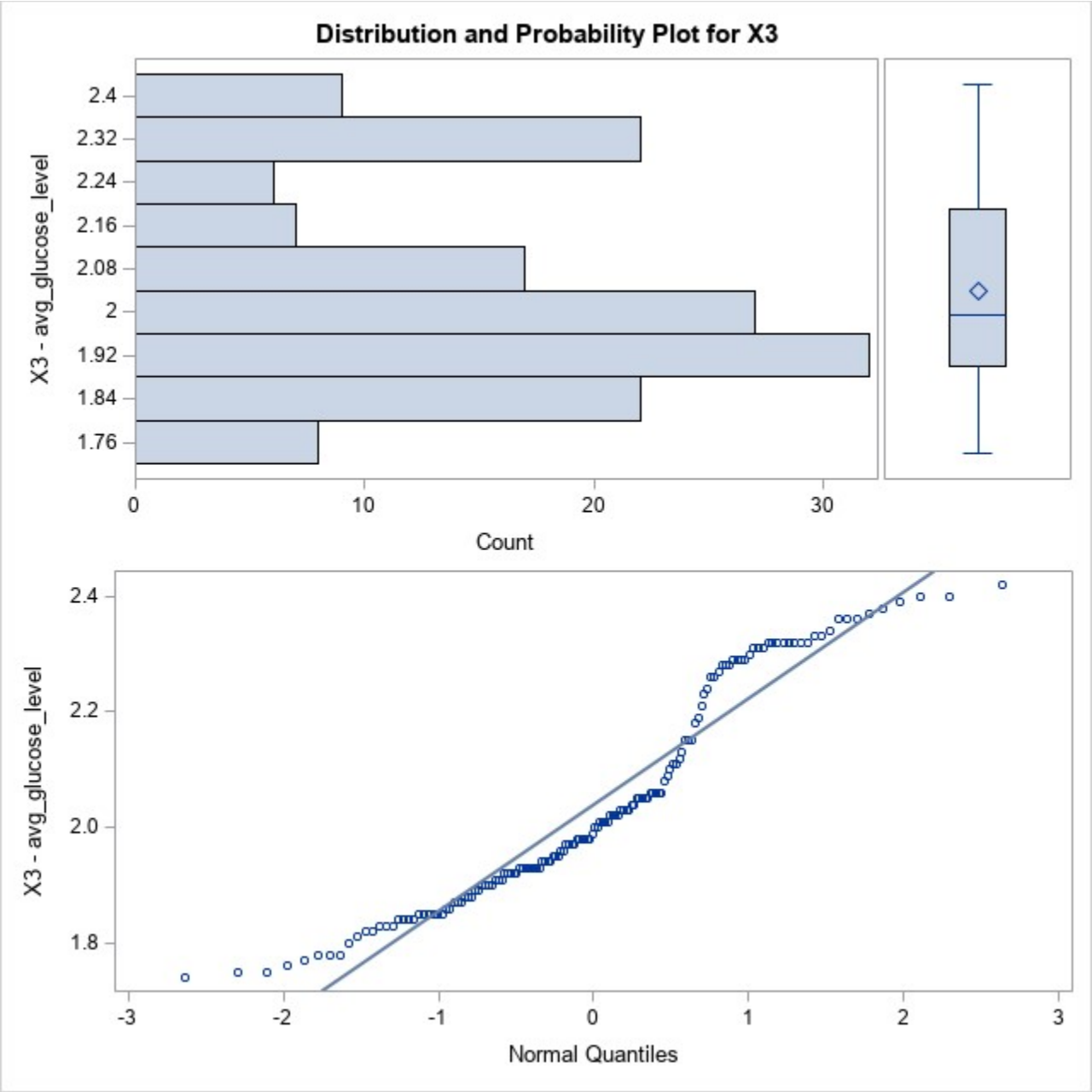
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	135.6556	Pr > |t|	<.0001
Sign	M	75	Pr >= |M|	<.0001
Signed Rank	S	5662.5	Pr >= |S|	<.0001

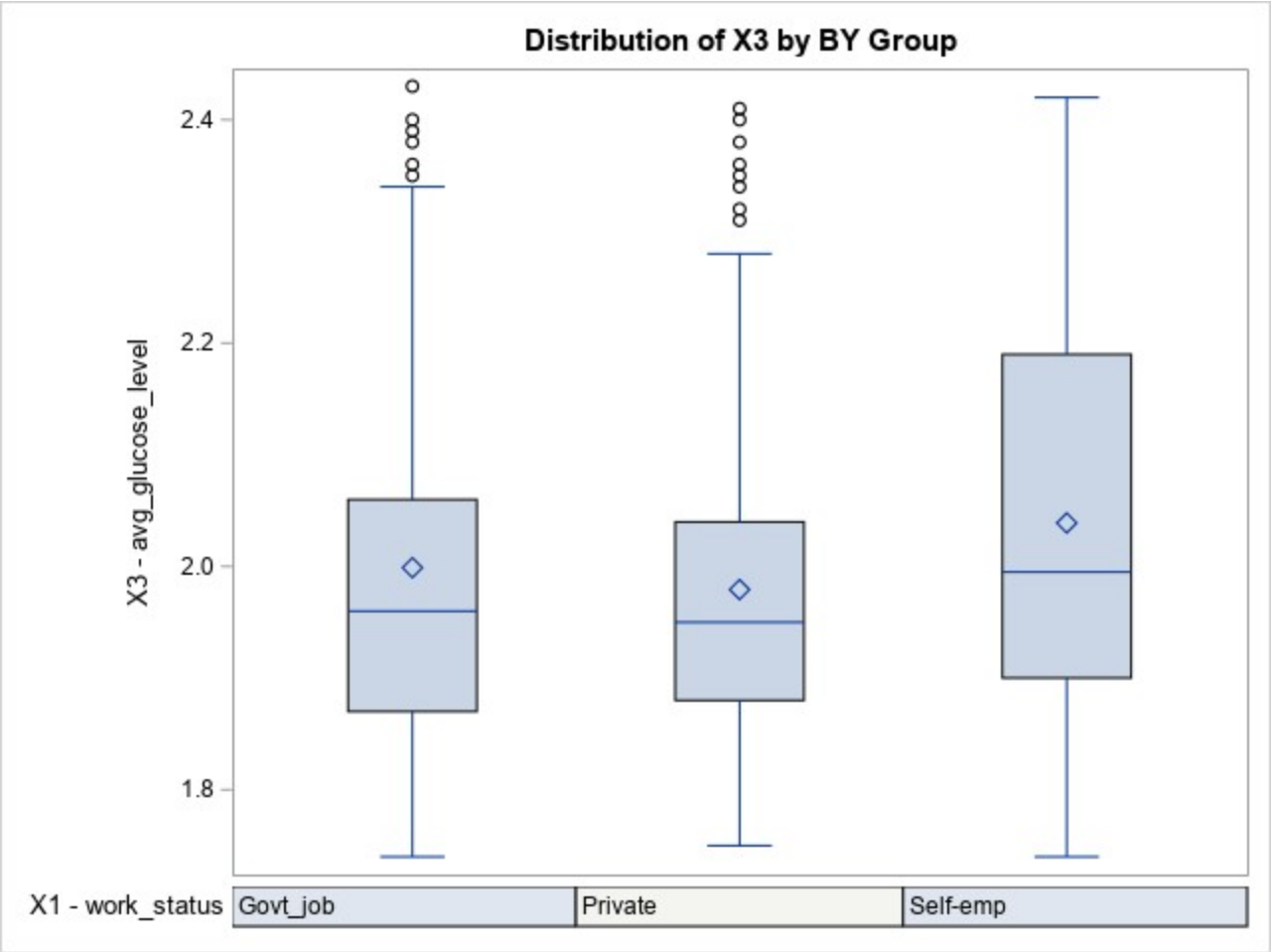
Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.924794	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.127777	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.683531	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	4.164562	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Level	Quantile
100% Max	2.420
99%	2.400
95%	2.360
90%	2.320
75% Q3	2.190
50% Median	1.995
25% Q1	1.900
10%	1.835
5%	1.780
1%	1.750
0% Min	1.740

Extreme Observations					
Lowest			Highest		
Value	X1	Obs	Value	X1	Obs
1.74	Self-emp	442	2.38	Self-emp	438
1.75	Self-emp	336	2.39	Self-emp	449
1.75	Self-emp	305	2.40	Self-emp	304
1.76	Self-emp	382	2.40	Self-emp	421
1.77	Self-emp	384	2.42	Self-emp	328


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.4
2.32
2.24
2.16
2.08
2
1.92
1.84
1.76
0
10
20
30
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles


Distribution of X3 by BY Group
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
X1 - work_status
Govt_job
Private
Self-emp

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

X2 - smoke_status=formerly

Moments			
N	150	Sum Weights	150
Mean	2.0128	Sum Observations	301.92
Std Deviation	0.18633563	Variance	0.03472097
Skewness	0.70714928	Kurtosis	-0.5491576
Uncorrected SS	612.878	Corrected SS	5.173424
Coeff Variation	9.25753321	Std Error Mean	0.01521424

Basic Statistical Measures			
Location		Variability	
Mean	2.012800	Std Deviation	0.18634
Median	1.965000	Variance	0.03472
Mode	1.900000	Range	0.68000
		Interquartile Range	0.17000

Note: The mode displayed is the smallest of 5 modes with a count of 7.

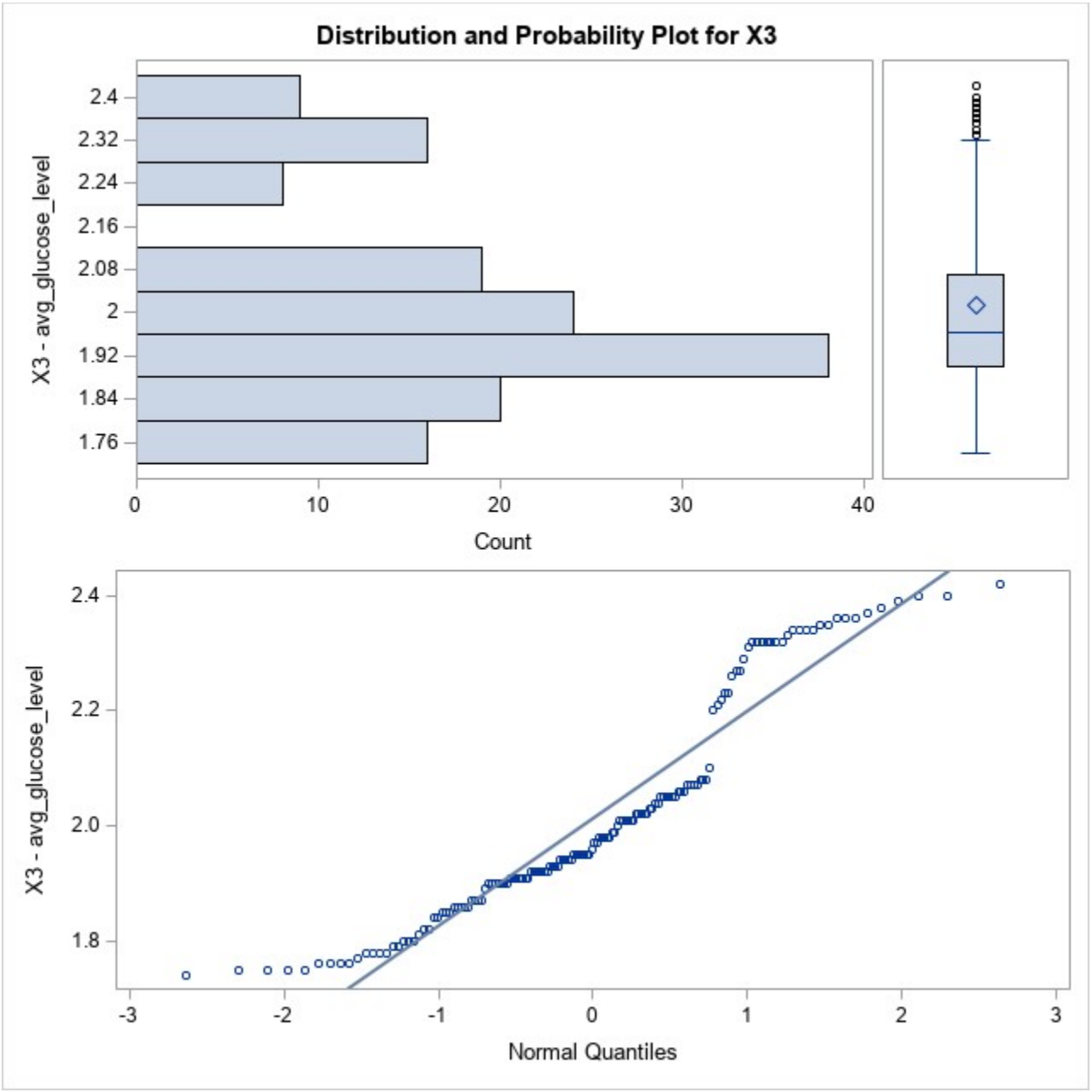
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	132.2971	Pr > |t|	<.0001
Sign	M	75	Pr >= |M|	<.0001
Signed Rank	S	5662.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.906842	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.132765	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.811244	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	5.029288	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Level	Quantile
100% Max	2.420
99%	2.400
95%	2.360
90%	2.335
75% Q3	2.070
50% Median	1.965
25% Q1	1.900
10%	1.790
5%	1.760
1%	1.750
0% Min	1.740

Extreme Observations					
Lowest			Highest		
Value	X2	Obs	Value	X2	Obs
1.74	formerly	16	2.38	formerly	36
1.75	formerly	136	2.39	formerly	9
1.75	formerly	105	2.40	formerly	1
1.75	formerly	95	2.40	formerly	104
1.75	formerly	87	2.42	formerly	128


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.4
2.32
2.24
2.16
2.08
2
1.92
1.84
1.76
0
10
20
30
40
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

X2 - smoke_status=never_sm

Moments			
N	150	Sum Weights	150
Mean	2.00153333	Sum Observations	300.23
Std Deviation	0.1621075	Variance	0.02627884
Skewness	0.85248454	Kurtosis	-0.1111313
Uncorrected SS	604.8359	Corrected SS	3.91554733
Coeff Variation	8.09916558	Std Error Mean	0.01323602

Basic Statistical Measures			
Location		Variability	
Mean	2.001533	Std Deviation	0.16211
Median	1.960000	Variance	0.02628
Mode	1.840000	Range	0.68000
		Interquartile Range	0.18000

Note: The mode displayed is the smallest of 3 modes with a count of 7.

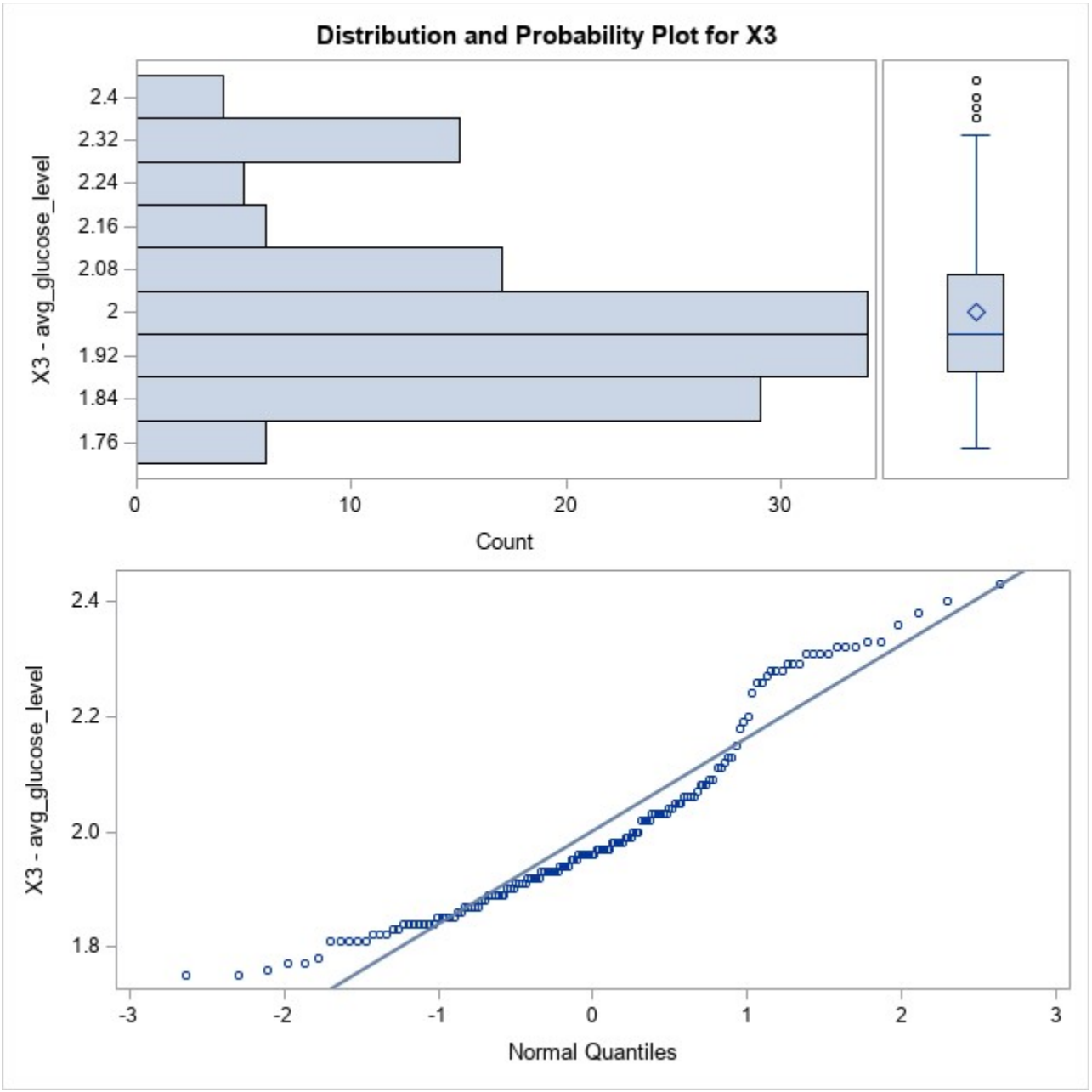
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	151.2186	Pr > |t|	<.0001
Sign	M	75	Pr >= |M|	<.0001
Signed Rank	S	5662.5	Pr >= |S|	<.0001

Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.91681	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.132838	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.689992	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	4.35584	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Level	Quantile
100% Max	2.43
99%	2.40
95%	2.32
90%	2.29
75% Q3	2.07
50% Median	1.96
25% Q1	1.89
10%	1.83
5%	1.81
1%	1.75
0% Min	1.75

Extreme Observations					
Lowest			Highest		
Value	X2	Obs	Value	X2	Obs
1.75	never_sm	232	2.33	never_sm	280
1.75	never_sm	189	2.36	never_sm	292
1.76	never_sm	282	2.38	never_sm	171
1.77	never_sm	284	2.40	never_sm	213
1.77	never_sm	183	2.43	never_sm	188


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.4
2.32
2.24
2.16
2.08
2
1.92
1.84
1.76
0
10
20
30
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles

SAS Program-Homework

The UNIVARIATE Procedure
Variable: X3 (X3 - avg_glucose_level)

X2 - smoke_status=smokes

Moments			
N	150	Sum Weights	150
Mean	2.0028	Sum Observations	300.42
Std Deviation	0.17012084	Variance	0.0289411
Skewness	0.79109133	Kurtosis	-0.1332529
Uncorrected SS	605.9934	Corrected SS	4.312224
Coeff Variation	8.49415026	Std Error Mean	0.01389031

Basic Statistical Measures			
Location		Variability	
Mean	2.002800	Std Deviation	0.17012
Median	1.970000	Variance	0.02894
Mode	1.910000	Range	0.67000
		Interquartile Range	0.21000

Note: The mode displayed is the smallest of 2 modes with a count of 8.

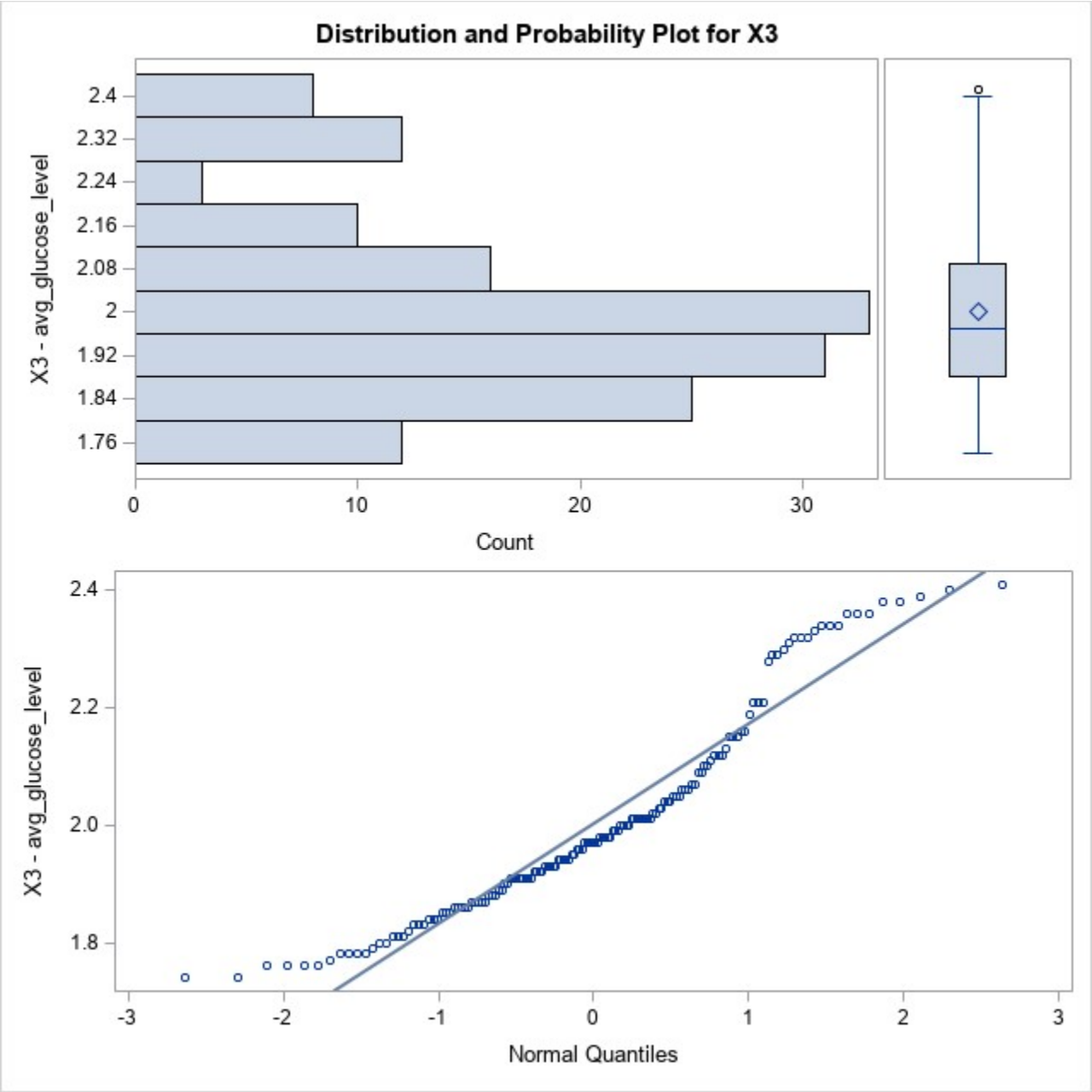
Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	144.1869	Pr > |t|	<.0001
Sign	M	75	Pr >= |M|	<.0001
Signed Rank	S	5662.5	Pr >= |S|	<.0001

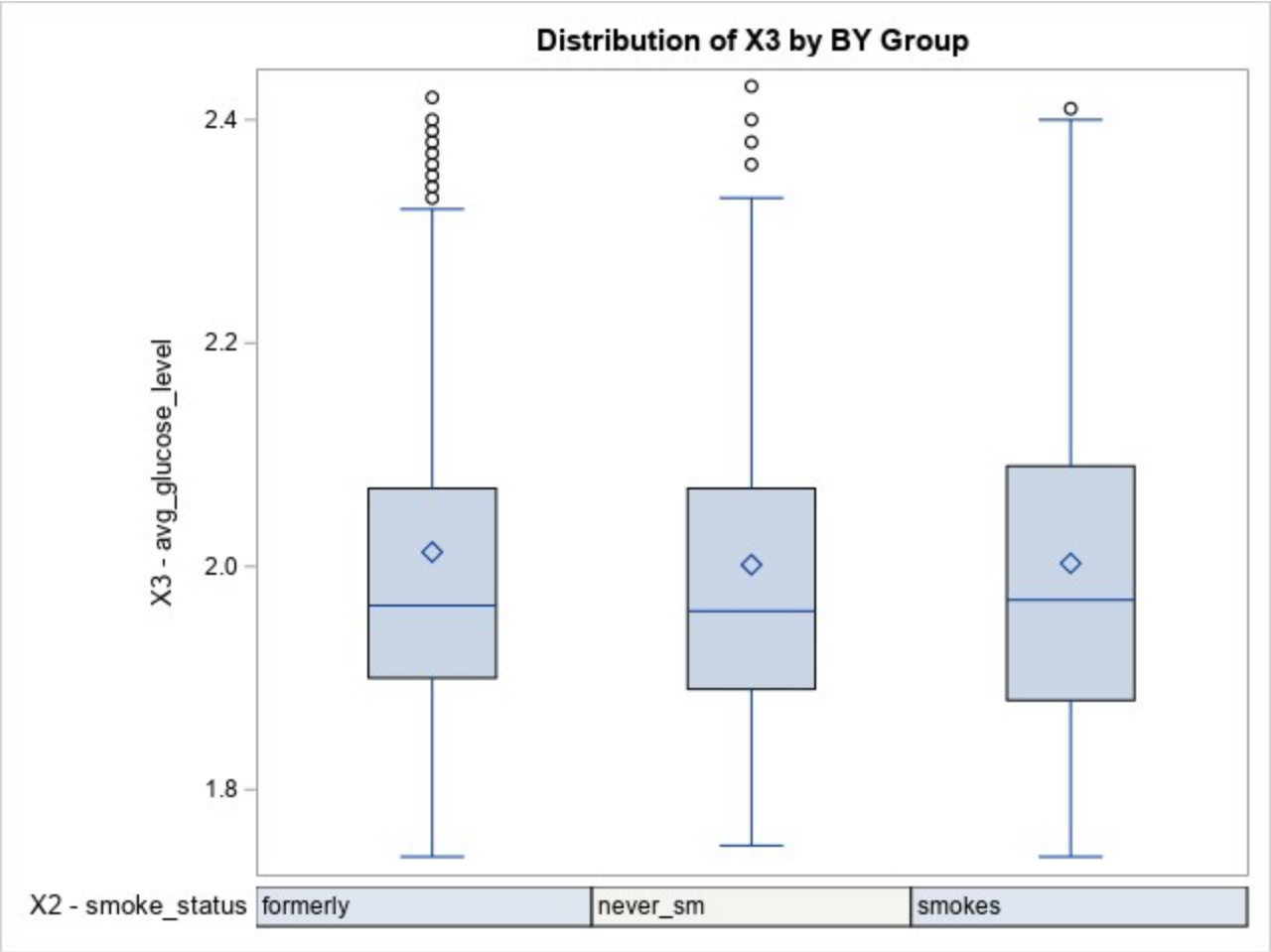
Tests for Normality				
Test	Statistic		p Value	
Shapiro-Wilk	W	0.926365	Pr < W	<0.0001
Kolmogorov-Smirnov	D	0.129787	Pr > D	<0.0100
Cramer-von Mises	W-Sq	0.530562	Pr > W-Sq	<0.0050
Anderson-Darling	A-Sq	3.471947	Pr > A-Sq	<0.0050

Quantiles (Definition 5)

Level	Quantile
100% Max	2.410
99%	2.400
95%	2.360
90%	2.315
75% Q3	2.090
50% Median	1.970
25% Q1	1.880
10%	1.810
5%	1.780
1%	1.740
0% Min	1.740

Extreme Observations					
Lowest			Highest		
Value	X2	Obs	Value	X2	Obs
1.74	smokes	442	2.38	smokes	363
1.74	smokes	304	2.38	smokes	438
1.76	smokes	394	2.39	smokes	449
1.76	smokes	373	2.40	smokes	421
1.76	smokes	346	2.41	smokes	353


Distribution and Probability Plot for X3
X3 - avg_glucose_level
2.4
2.32
2.24
2.16
2.08
2
1.92
1.84
1.76
0
10
20
30
Count
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
-3
-2
-1
0
1
2
3
Normal Quantiles


Distribution of X3 by BY Group
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
X2 - smoke_status
formerly
never_sm
smokes

SAS Program-Homework

The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
X1	3	Govt_job Private Self-emp

Number of Observations Read	450
Number of Observations Used	450

SAS Program-Homework

The GLM Procedure

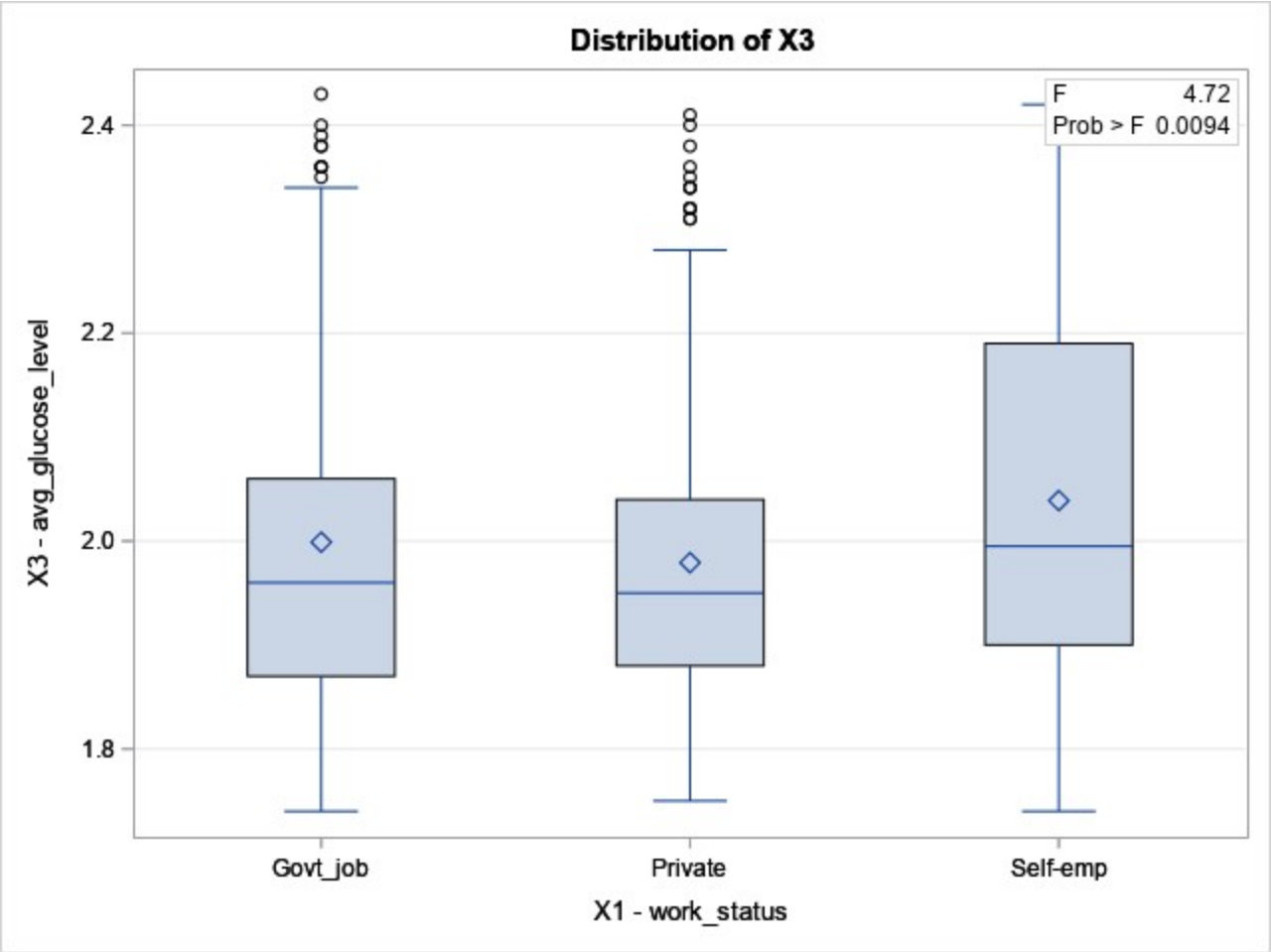
Dependent Variable: X3 X3 - avg_glucose_level

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.27734444	0.13867222	4.72	0.0094
Error	447	13.13527800	0.02938541		
Corrected Total	449	13.41262244			

R-Square	Coeff Var	Root MSE	X3 Mean
0.020678	8.546681	0.171422	2.005711

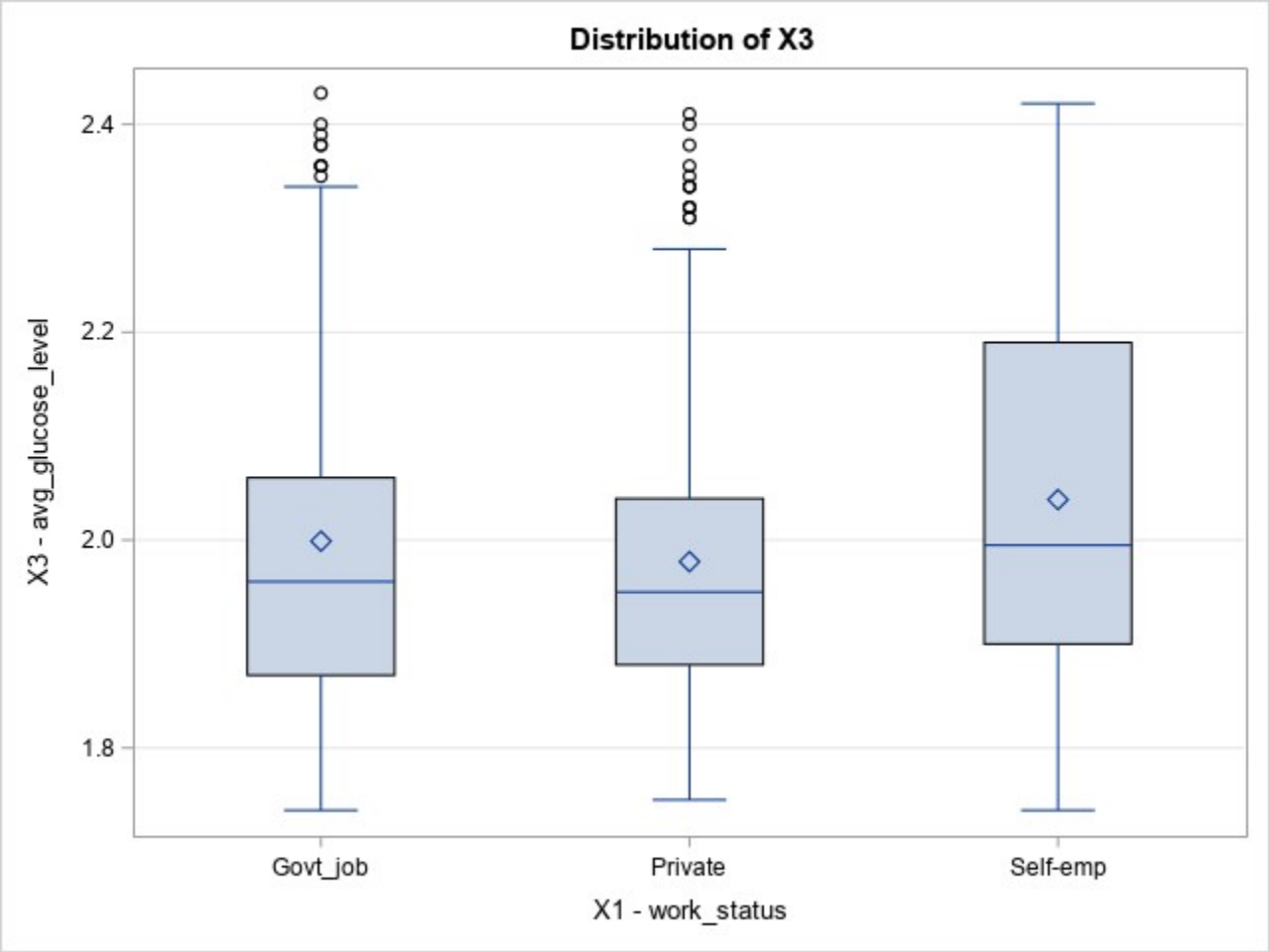
Source	DF	Type I SS	Mean Square	F Value	Pr > F
X1	2	0.27734444	0.13867222	4.72	0.0094

Source	DF	Type III SS	Mean Square	F Value	Pr > F
X1	2	0.27734444	0.13867222	4.72	0.0094


Distribution of X3
F 4.72
Prob > F 0.0094
2.4
2.2
2.0
1.8
X3 - avg_glucose_level
Govt_job
Private
Self-emp
X1 - work_status

SAS Program-Homework

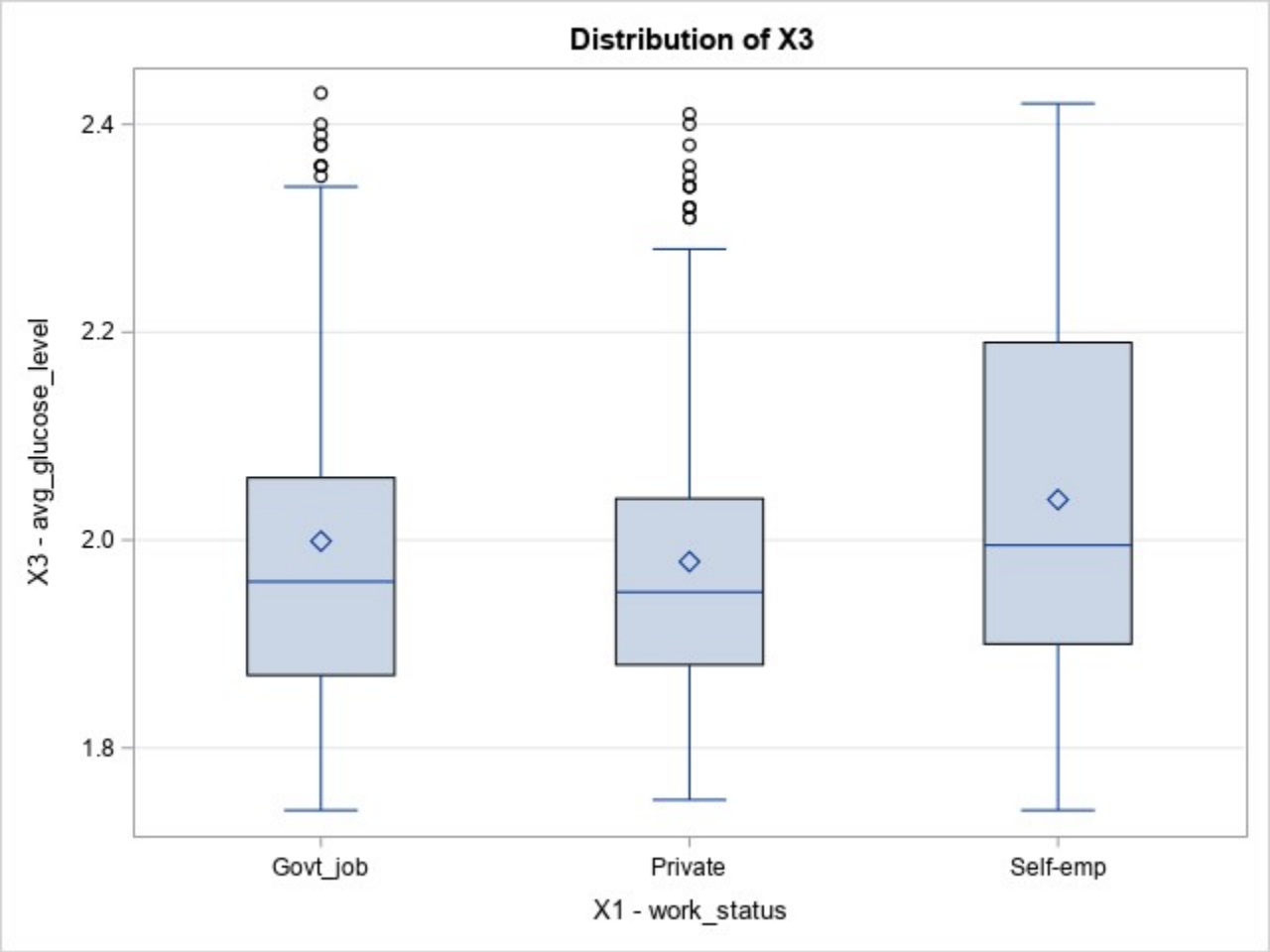
The GLM Procedure



Level of X1	N	X3	
		Mean	Std Dev
Govt_job	150	1.99893333	0.17193001
Private	150	1.97926667	0.15719477
Self-emp	150	2.03893333	0.18408178

SAS Program-Homework

The GLM Procedure



SAS Program-Homework

The GLM Procedure

t Tests (LSD) for X3

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	447
Error Mean Square	0.029385
Critical Value of t	1.96529
Least Significant Difference	0.0389

Comparisons significant at the 0.05 level are indicated by *.**

X1 Comparison	Difference Between Means	95% Confidence Limits		
Self-emp - Govt_job	0.04000	0.00110	0.07890	***
Self-emp - Private	0.05967	0.02077	0.09857	***
Govt_job - Self-emp	-0.04000	-0.07890	-0.00110	***
Govt_job - Private	0.01967	-0.01923	0.05857	
Private - Self-emp	-0.05967	-0.09857	-0.02077	***
Private - Govt_job	-0.01967	-0.05857	0.01923	

SAS Program-Homework

The GLM Procedure

Bonferroni (Dunn) t Tests for X3

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

Alpha	0.05
Error Degrees of Freedom	447
Error Mean Square	0.029385
Critical Value of t	2.40302
Minimum Significant Difference	0.0476

Comparisons significant at the 0.05 level are indicated by *.**

X1 Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
Self-emp - Govt_job	0.04000	-0.00757	0.08757	
Self-emp - Private	0.05967	0.01210	0.10723	***
Govt_job - Self-emp	-0.04000	-0.08757	0.00757	
Govt_job - Private	0.01967	-0.02790	0.06723	
Private - Self-emp	-0.05967	-0.10723	-0.01210	***
Private - Govt_job	-0.01967	-0.06723	0.02790	

SAS Program-Homework

The GLM Procedure

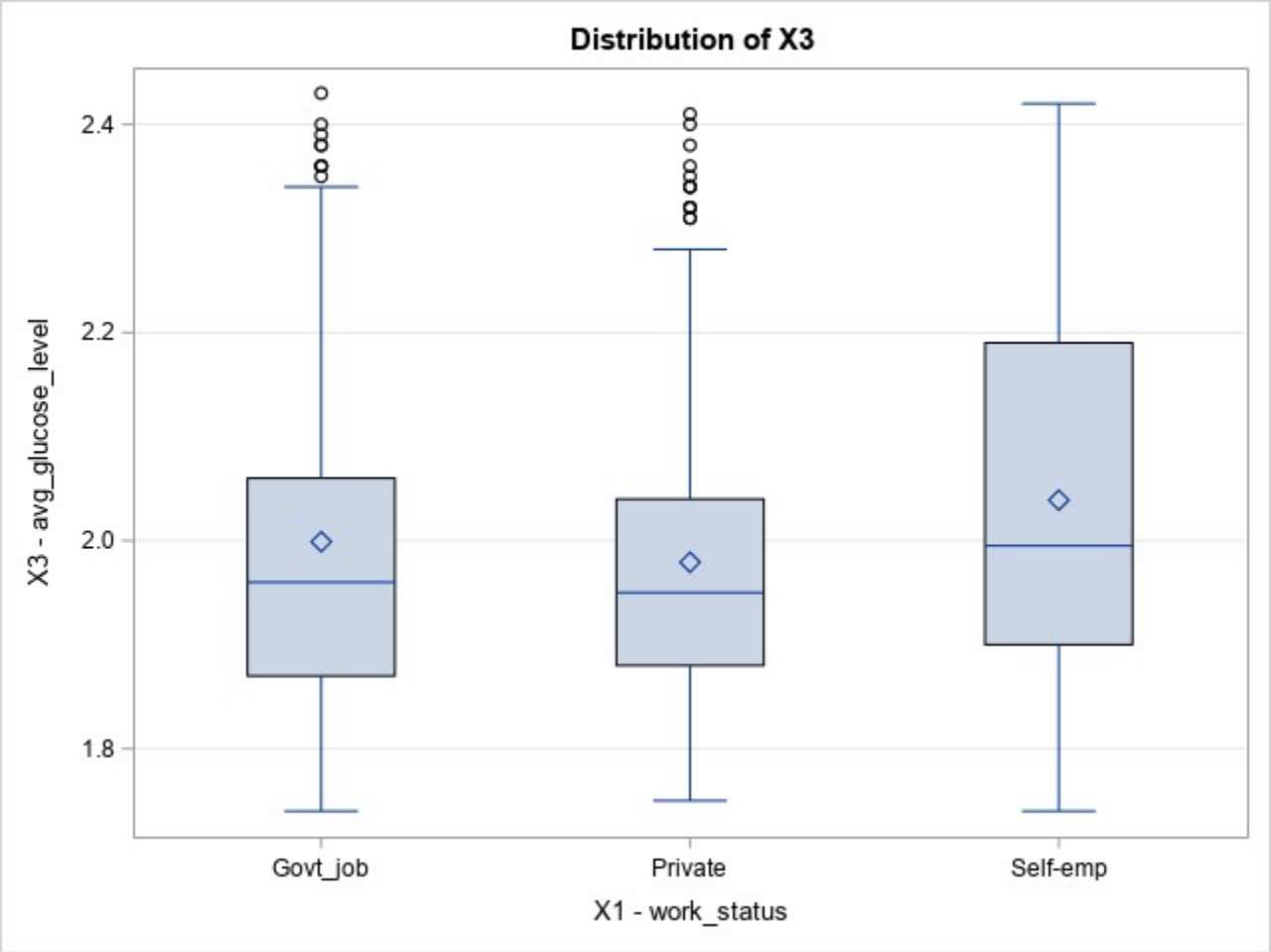
Levene's Test for Homogeneity of X3 Variance ANOVA of Squared Deviations from Group Means					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
X1	2	0.00624	0.00312	2.12	0.1210
Error	447	0.6569	0.00147		

Brown and Forsythe's Test for Homogeneity of X3 Variance ANOVA of Absolute Deviations from Group Medians					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
X1	2	0.0845	0.0423	3.21	0.0412
Error	447	5.8791	0.0132		

Bartlett's Test for Homogeneity of X3 Variance			
Source	DF	Chi-Square	Pr > ChiSq
X1	2	3.6923	0.1578

SAS Program-Homework

The GLM Procedure



Level of X1	N	X3	
		Mean	Std Dev
Govt_job	150	1.99893333	0.17193001
Private	150	1.97926667	0.15719477
Self-emp	150	2.03893333	0.18408178

SAS Program-Homework

The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
X2	3	formerly never_sm smokes

Number of Observations Read	450
Number of Observations Used	450

SAS Program-Homework

The GLM Procedure

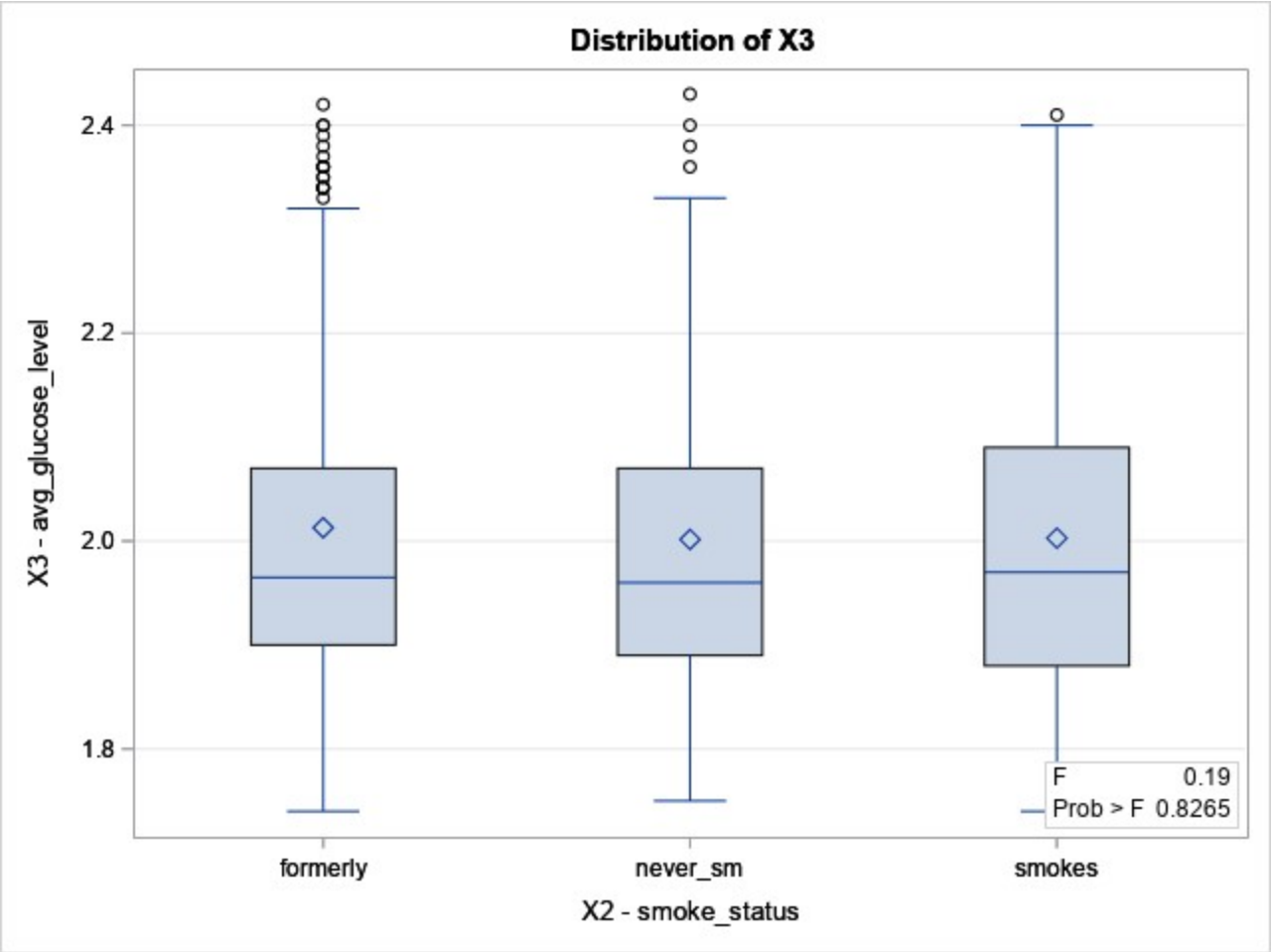
Dependent Variable: X3 X3 - avg_glucose_level

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	2	0.01142711	0.00571356	0.19	0.8265
Error	447	13.40119533	0.02998030		
Corrected Total	449	13.41262244			

R-Square	Coeff Var	Root MSE	X3 Mean
0.000852	8.632759	0.173148	2.005711

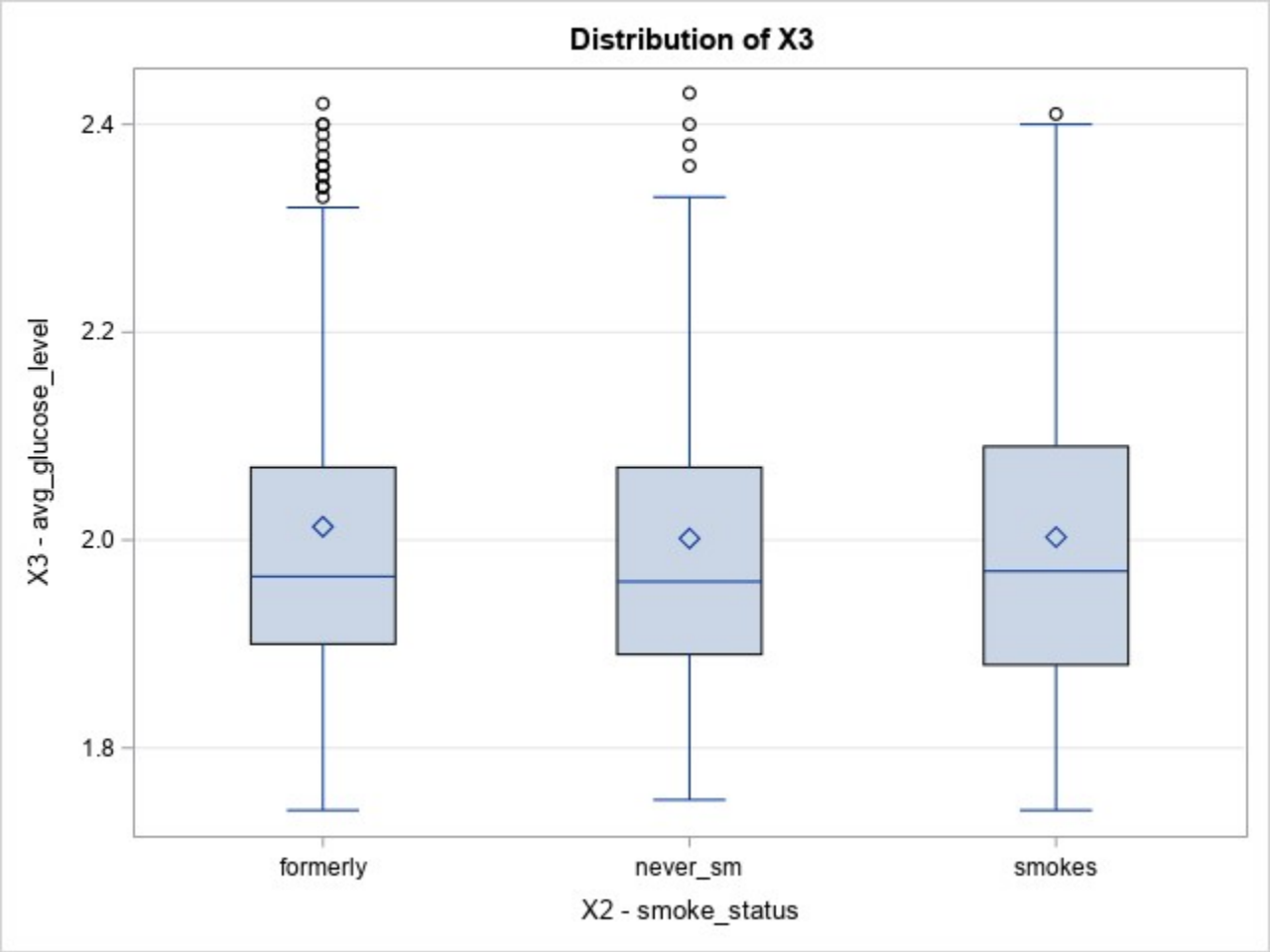
Source	DF	Type I SS	Mean Square	F Value	Pr > F
X2	2	0.01142711	0.00571356	0.19	0.8265

Source	DF	Type III SS	Mean Square	F Value	Pr > F
X2	2	0.01142711	0.00571356	0.19	0.8265


Distribution of X3
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
F 0.19
Prob > F 0.8265
formerly
never_sm
smokes
X2 - smoke_status

SAS Program-Homework

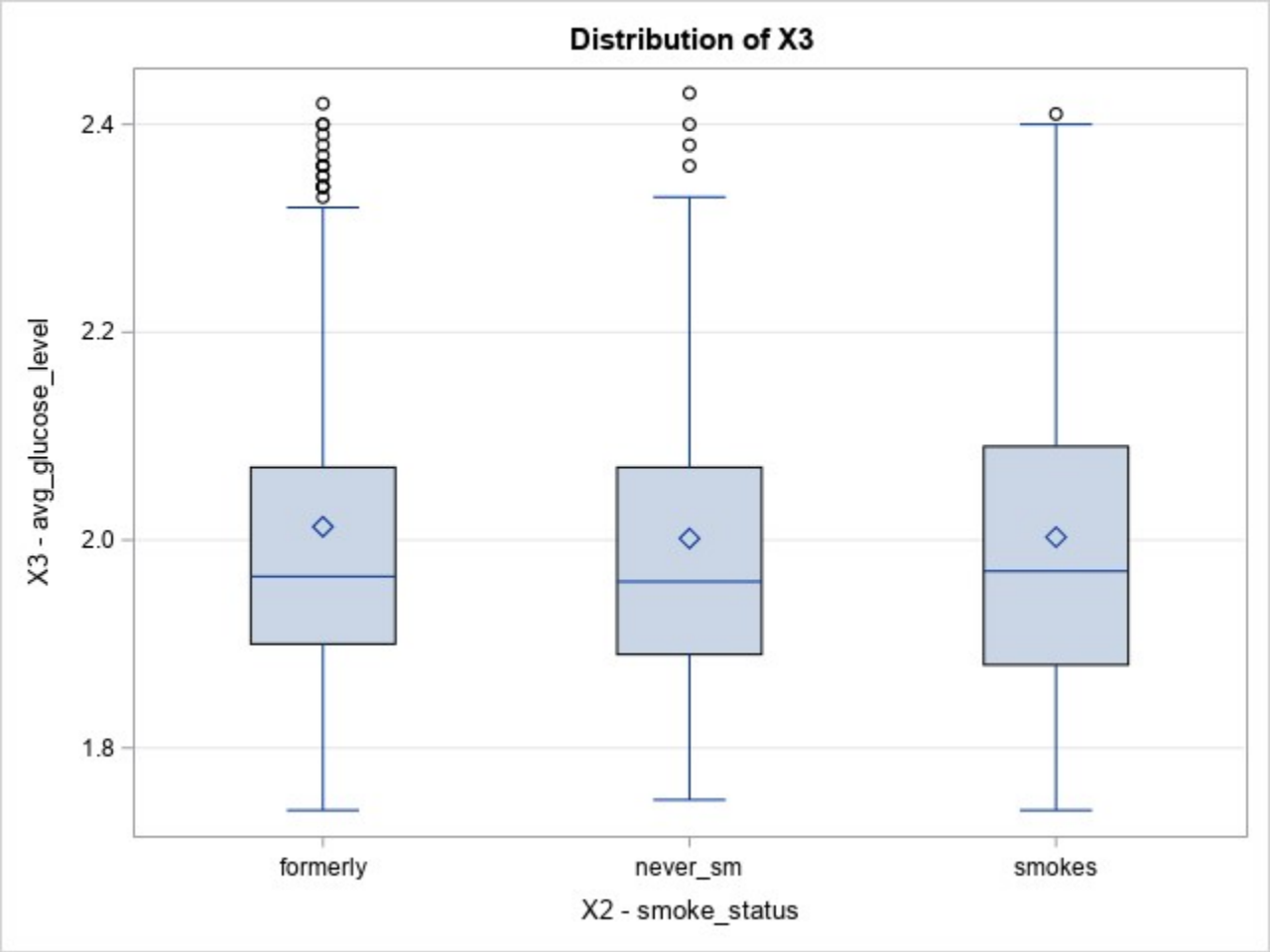
The GLM Procedure



Level of X2	N	X3	
		Mean	Std Dev
formerly	150	2.01280000	0.18633563
never_sm	150	2.00153333	0.16210750
smokes	150	2.00280000	0.17012084

SAS Program-Homework

The GLM Procedure



SAS Program-Homework

The GLM Procedure

t Tests (LSD) for X3

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	447
Error Mean Square	0.02998
Critical Value of t	1.96529
Least Significant Difference	0.0393

Comparisons significant at the 0.05 level are indicated by *.**

X2 Comparison	Difference Between Means	95% Confidence Limits		
formerly - smokes	0.01000	-0.02929	0.04929	
formerly - never_sm	0.01127	-0.02803	0.05056	
smokes - formerly	-0.01000	-0.04929	0.02929	
smokes - never_sm	0.00127	-0.03803	0.04056	
never_sm - formerly	-0.01127	-0.05056	0.02803	
never_sm - smokes	-0.00127	-0.04056	0.03803	

SAS Program-Homework

The GLM Procedure

Bonferroni (Dunn) t Tests for X3

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

Alpha	0.05
Error Degrees of Freedom	447
Error Mean Square	0.02998
Critical Value of t	2.40302
Minimum Significant Difference	0.048

Comparisons significant at the 0.05 level are indicated by *.**

X2 Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
formerly - smokes	0.01000	-0.03804	0.05804	
formerly - never_sm	0.01127	-0.03678	0.05931	
smokes - formerly	-0.01000	-0.05804	0.03804	
smokes - never_sm	0.00127	-0.04678	0.04931	
never_sm - formerly	-0.01127	-0.05931	0.03678	
never_sm - smokes	-0.00127	-0.04931	0.04678	

SAS Program-Homework

The GLM Procedure

Levene's Test for Homogeneity of X3 Variance ANOVA of Squared Deviations from Group Means					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
X2	2	0.00551	0.00276	1.84	0.1607
Error	447	0.6714	0.00150		

Brown and Forsythe's Test for Homogeneity of X3 Variance ANOVA of Absolute Deviations from Group Medians					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
X2	2	0.0344	0.0172	1.24	0.2917
Error	447	6.2227	0.0139		

Bartlett's Test for Homogeneity of X3 Variance			
Source	DF	Chi-Square	Pr > ChiSq
X2	2	3.0085	0.2222

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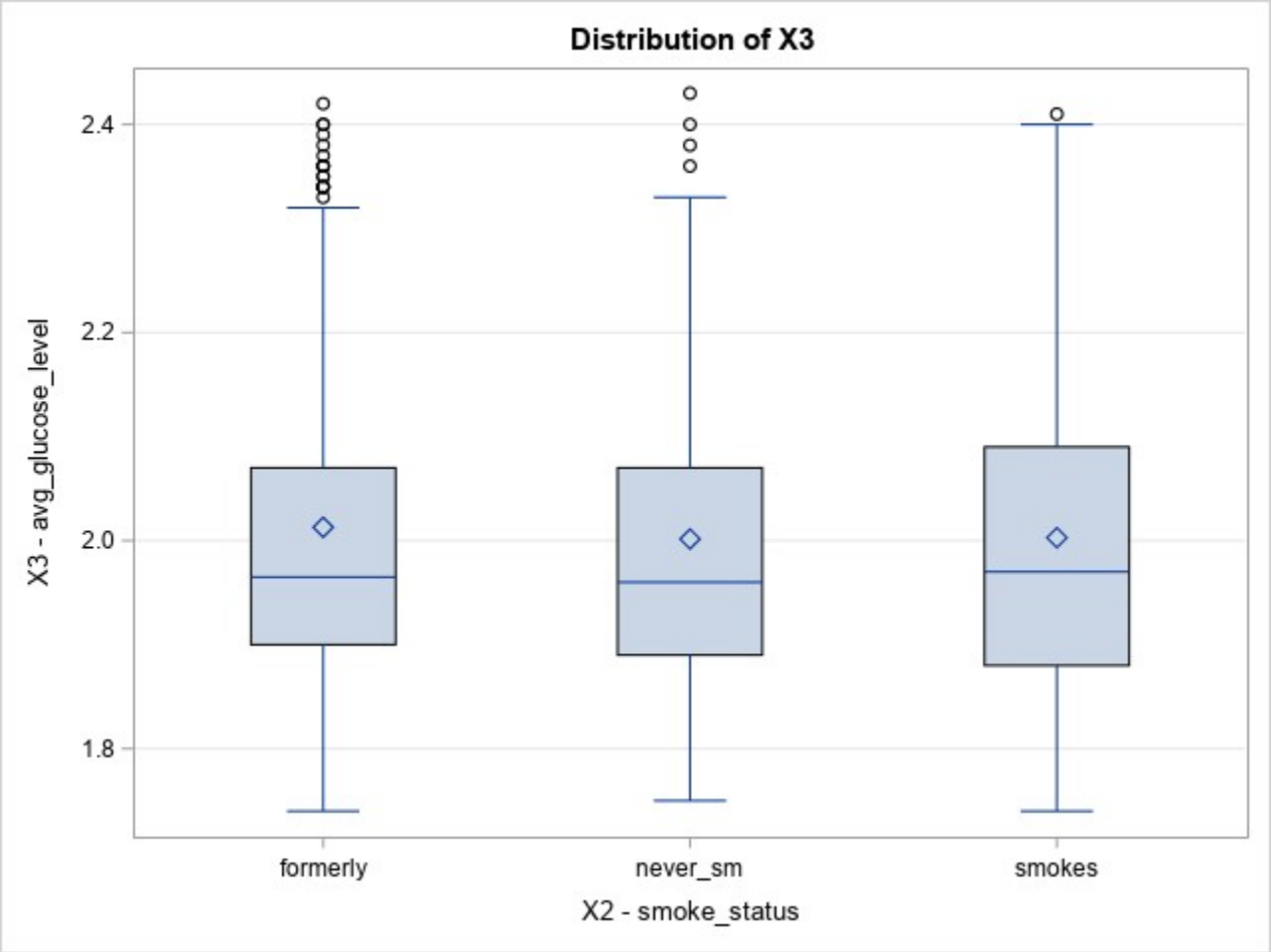
The GLM Procedure



Level of X2	N	X3	
		Mean	Std Dev
formerly	150	2.01280000	0.18633563
never_sm	150	2.00153333	0.16210750
smokes	150	2.00280000	0.17012084

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The GLM Procedure

Class Level Information		
Class	**Levels**	**Values**
X1	3	Govt_job Private Self-emp
X2	3	formerly never_sm smokes

Number of Observations Read	450
Number of Observations Used	450

SAS Program-Homework

The GLM Procedure

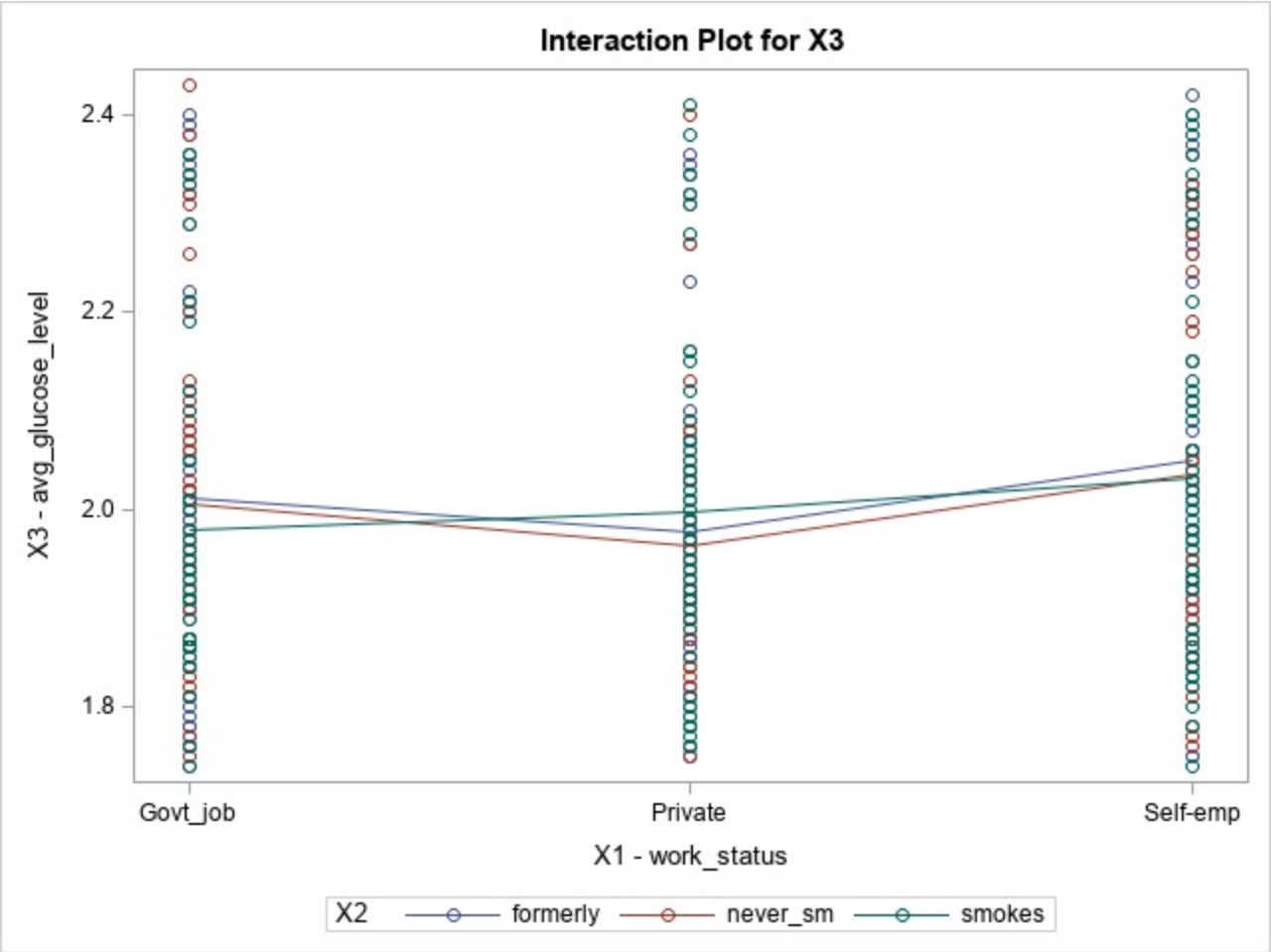
Dependent Variable: X3 X3 - avg_glucose_level

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	8	0.35029644	0.04378706	1.48	0.1627
Error	441	13.06232600	0.02961979		
Corrected Total	449	13.41262244			

R-Square	Coeff Var	Root MSE	X3 Mean
0.026117	8.580697	0.172104	2.005711

Source	DF	Type I SS	Mean Square	F Value	Pr > F
X1	2	0.27734444	0.13867222	4.68	0.0097
X2	2	0.01142711	0.00571356	0.19	0.8246
X1*X2	4	0.06152489	0.01538122	0.52	0.7216

Source	DF	Type III SS	Mean Square	F Value	Pr > F
X1	2	0.27734444	0.13867222	4.68	0.0097
X2	2	0.01142711	0.00571356	0.19	0.8246
X1*X2	4	0.06152489	0.01538122	0.52	0.7216


Interaction Plot for X3
X3 - avg_glucose_level
2.4
2.2
2.0
1.8
Govt_job
Private
Self-emp
X1 - work_status
X2
formerly
never_sm
smokes

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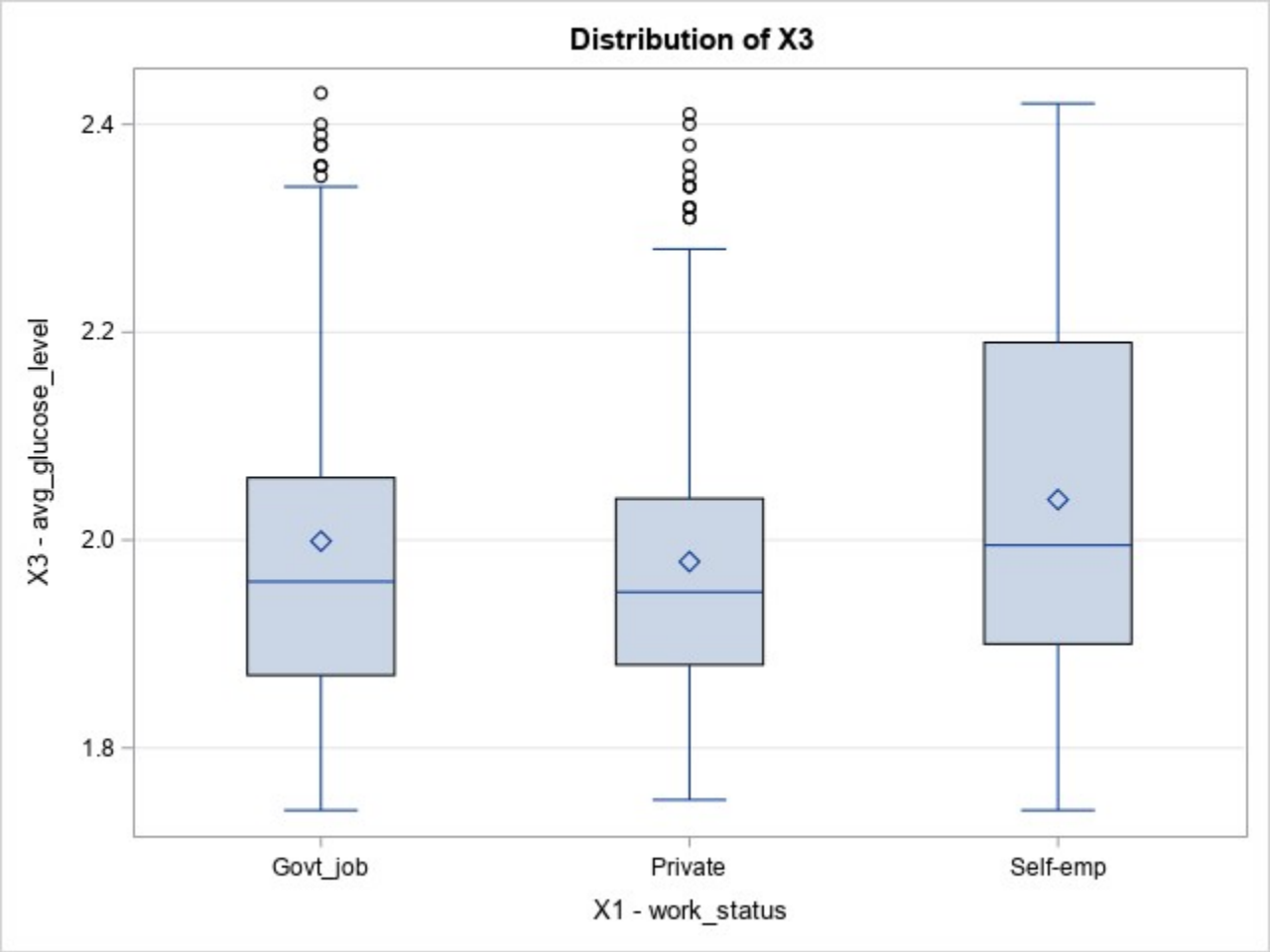
The GLM Procedure



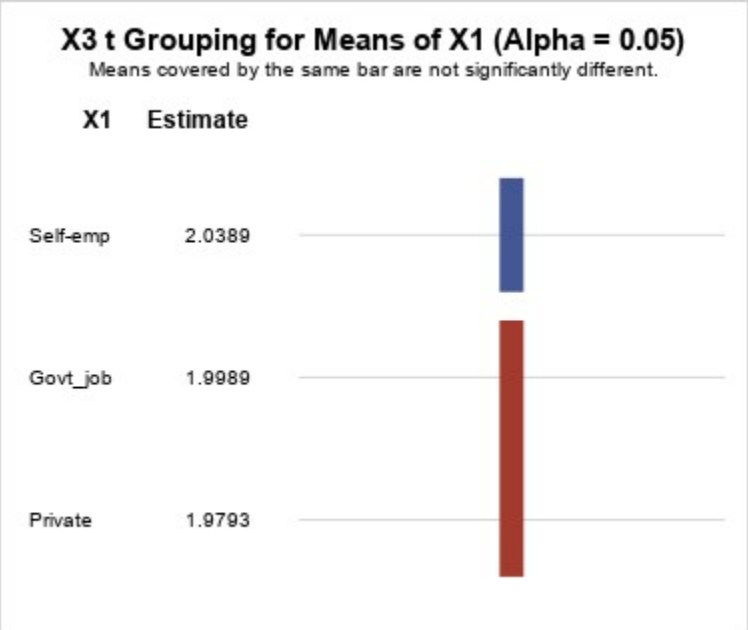
SAS Program-Homework

The GLM Procedure

t Tests (LSD) for X3

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962
Critical Value of t	1.96536
Least Significant Difference	0.0391



SAS Program-Homework

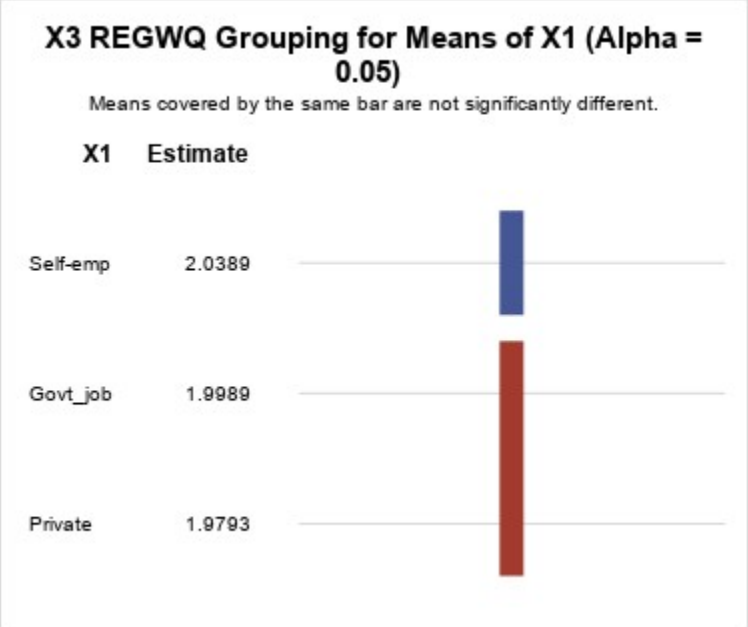
The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for X3

Note: This test controls the Type I experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962

Number of Means	**2**	**3**
Critical Range	0.0390573	0.0467341



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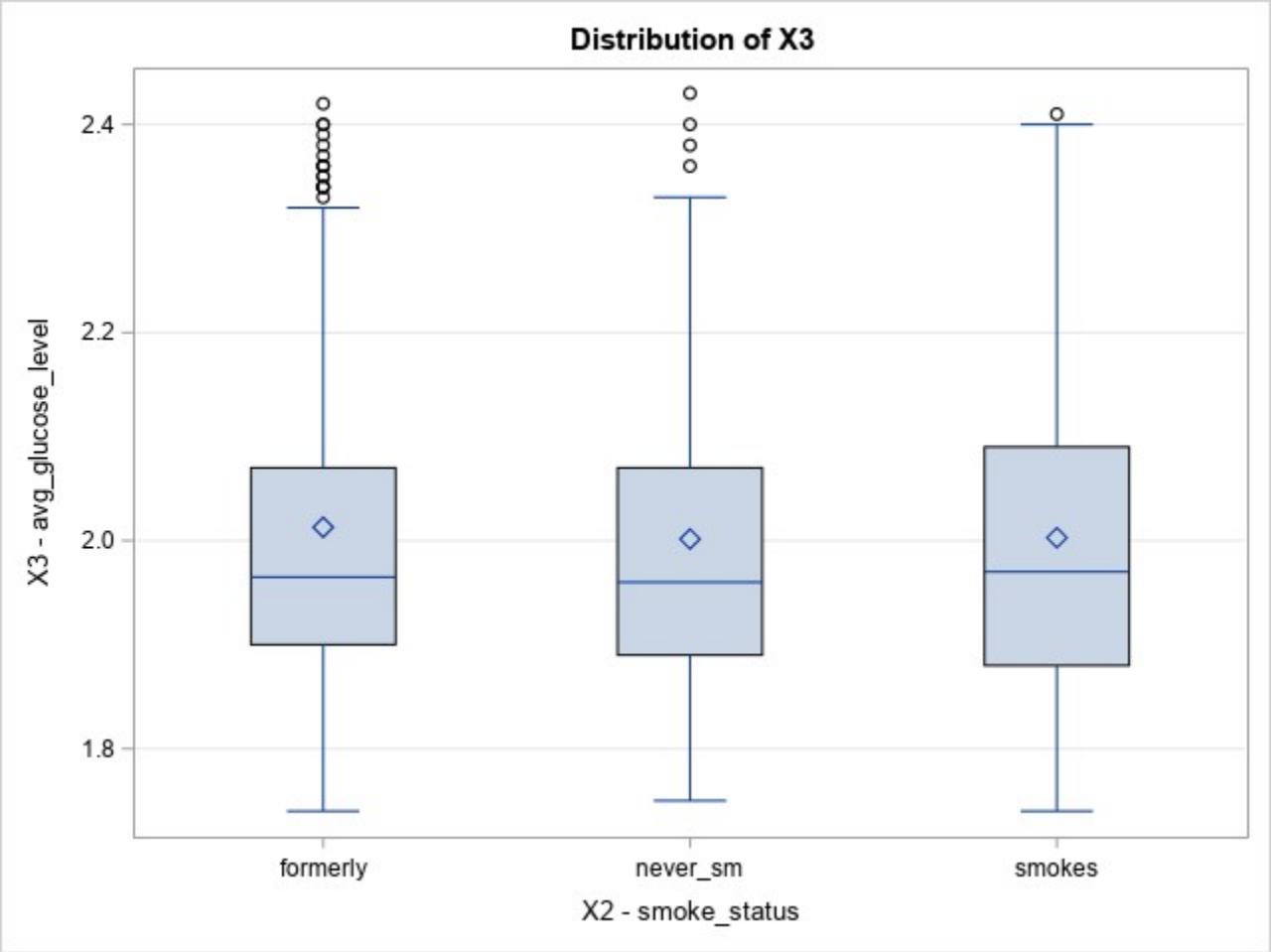
The GLM Procedure



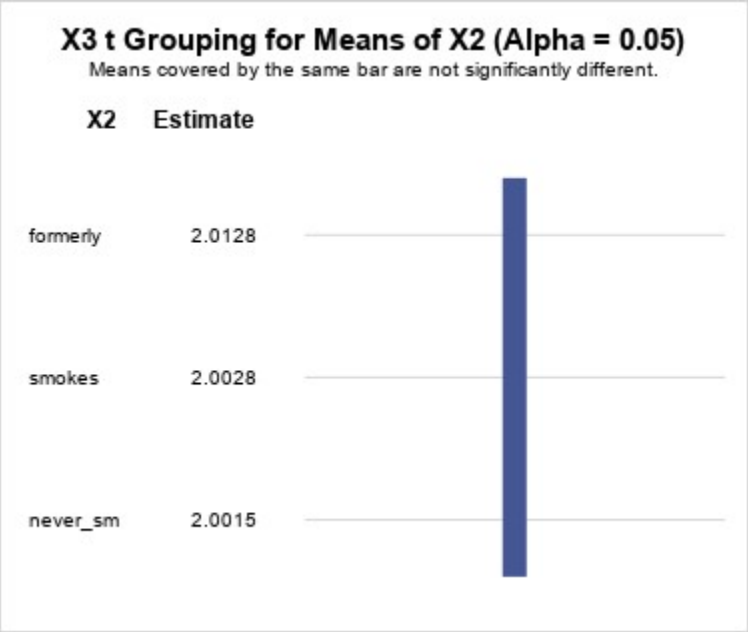
SAS Program-Homework

The GLM Procedure

t Tests (LSD) for X3

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962
Critical Value of t	1.96536
Least Significant Difference	0.0391



SAS Program-Homework

The GLM Procedure

Ryan-Einot-Gabriel-Welsch Multiple Range Test for X3

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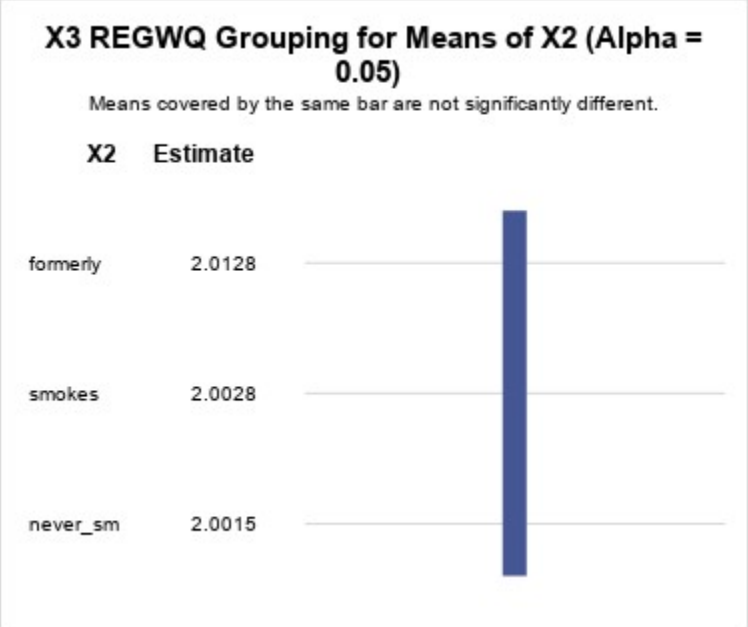

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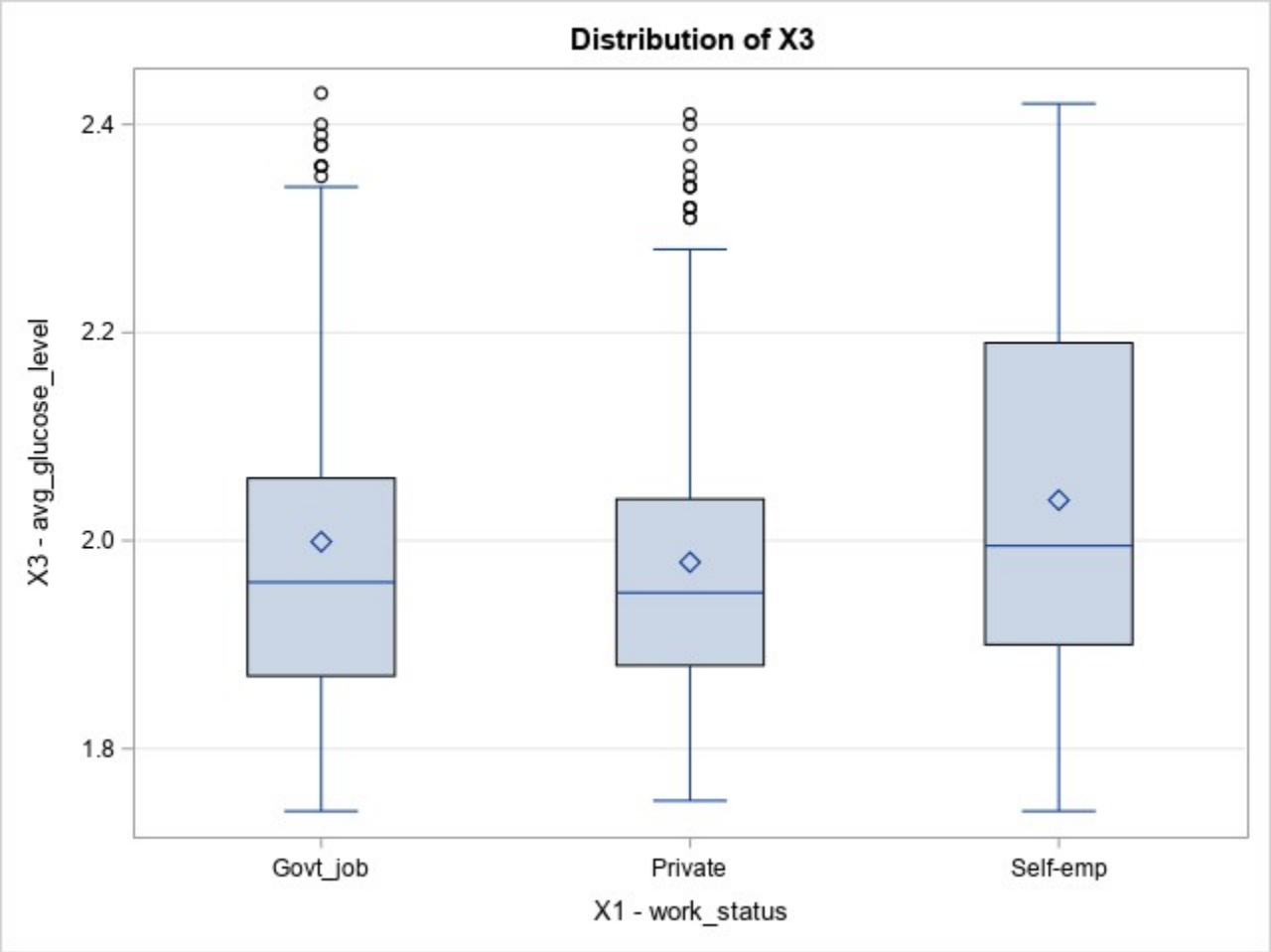
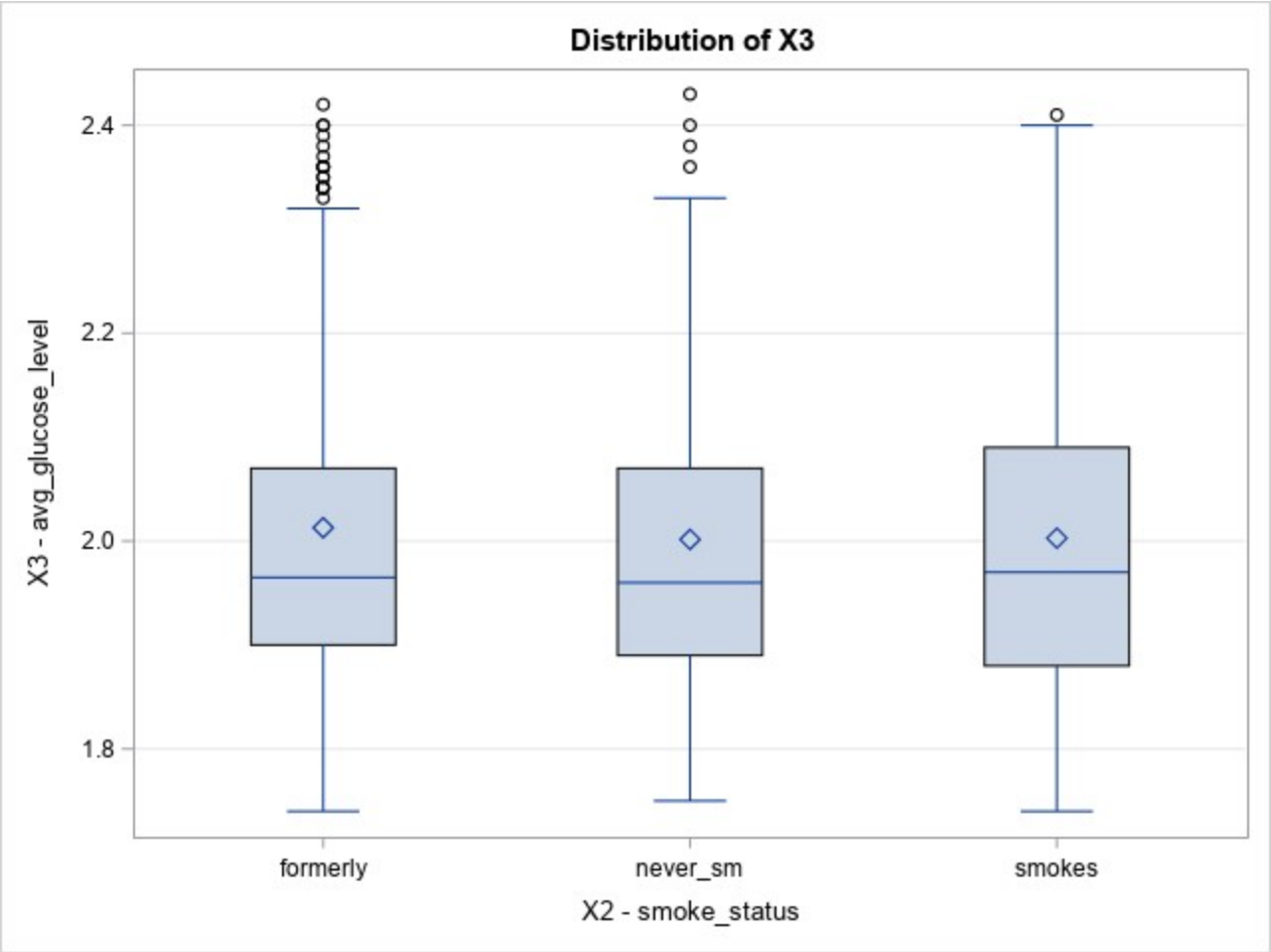
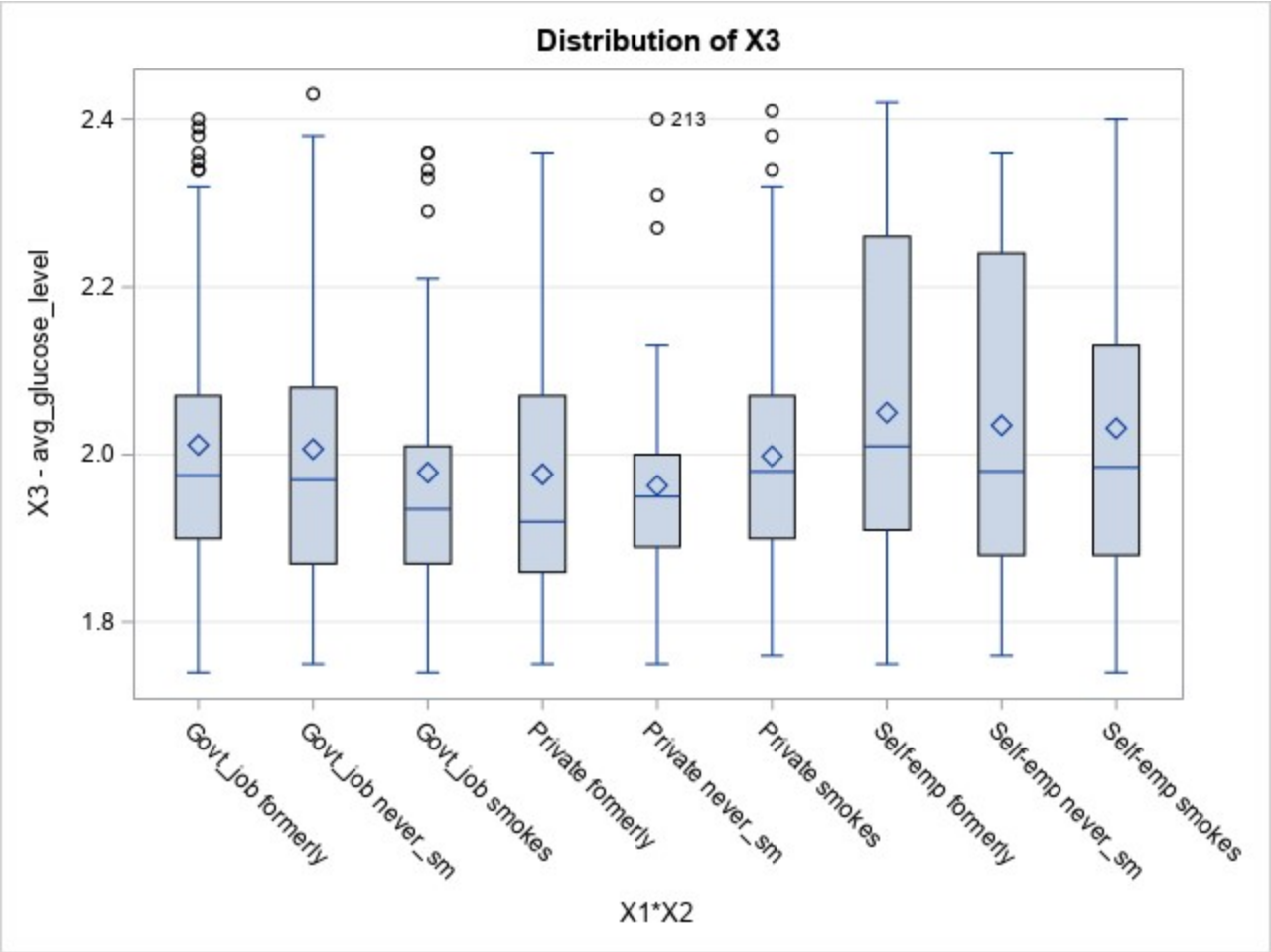
The GLM Procedure



Level of X1	N	X3	
		Mean	Std Dev
Govt_job	150	1.99893333	0.17193001
Private	150	1.97926667	0.15719477
Self-emp	150	2.03893333	0.18408178



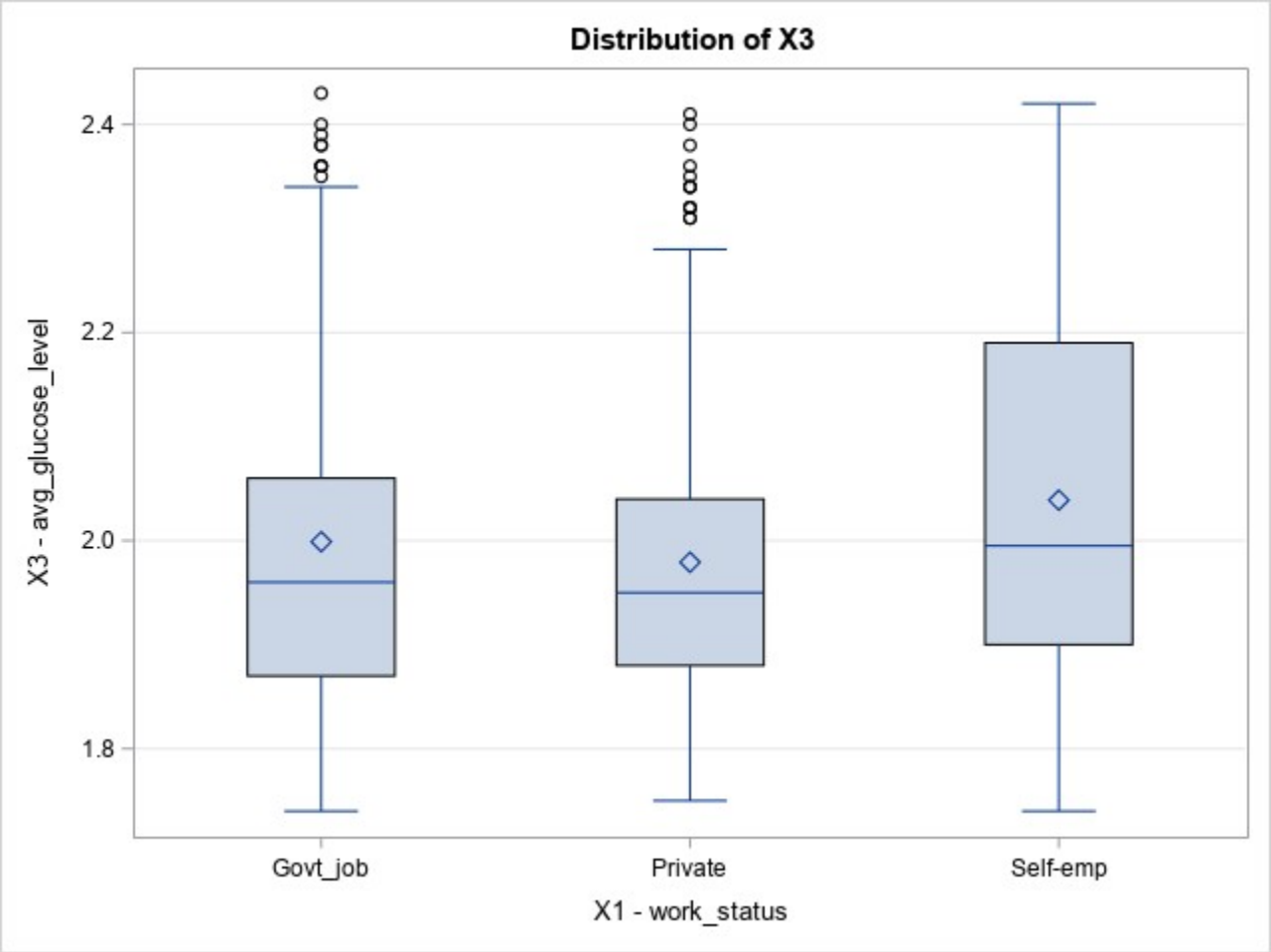
Level of X2	N	X3	
		Mean	Std Dev
formerly	150	2.01280000	0.18633563
never_sm	150	2.00153333	0.16210750
smokes	150	2.00280000	0.17012084



Level of X1	Level of X2	N	X3	
			Mean	Std Dev
Govt_job	formerly	50	2.01160000	0.18915883
Govt_job	never_sm	50	2.00660000	0.16666733
Govt_job	smokes	50	1.97860000	0.16025503
Private	formerly	50	1.97660000	0.17698853
Private	never_sm	50	1.96300000	0.12368904
Private	smokes	50	1.99820000	0.16694971
Self-emp	formerly	50	2.05020000	0.18896593
Self-emp	never_sm	50	2.03500000	0.18479166
Self-emp	smokes	50	2.03160000	0.18161812

SAS Program-Homework

The GLM Procedure



SAS Program-Homework

The GLM Procedure

t Tests (LSD) for X3

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962
Critical Value of t	1.96536
Least Significant Difference	0.0391

Comparisons significant at the 0.05 level are indicated by *.**

X1 Comparison	Difference Between Means	95% Confidence Limits		
Self-emp - Govt_job	0.04000	0.00094	0.07906	***
Self-emp - Private	0.05967	0.02061	0.09872	***
Govt_job - Self-emp	-0.04000	-0.07906	-0.00094	***
Govt_job - Private	0.01967	-0.01939	0.05872	
Private - Self-emp	-0.05967	-0.09872	-0.02061	***
Private - Govt_job	-0.01967	-0.05872	0.01939	

SAS Program-Homework

The GLM Procedure

Bonferroni (Dunn) t Tests for X3

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

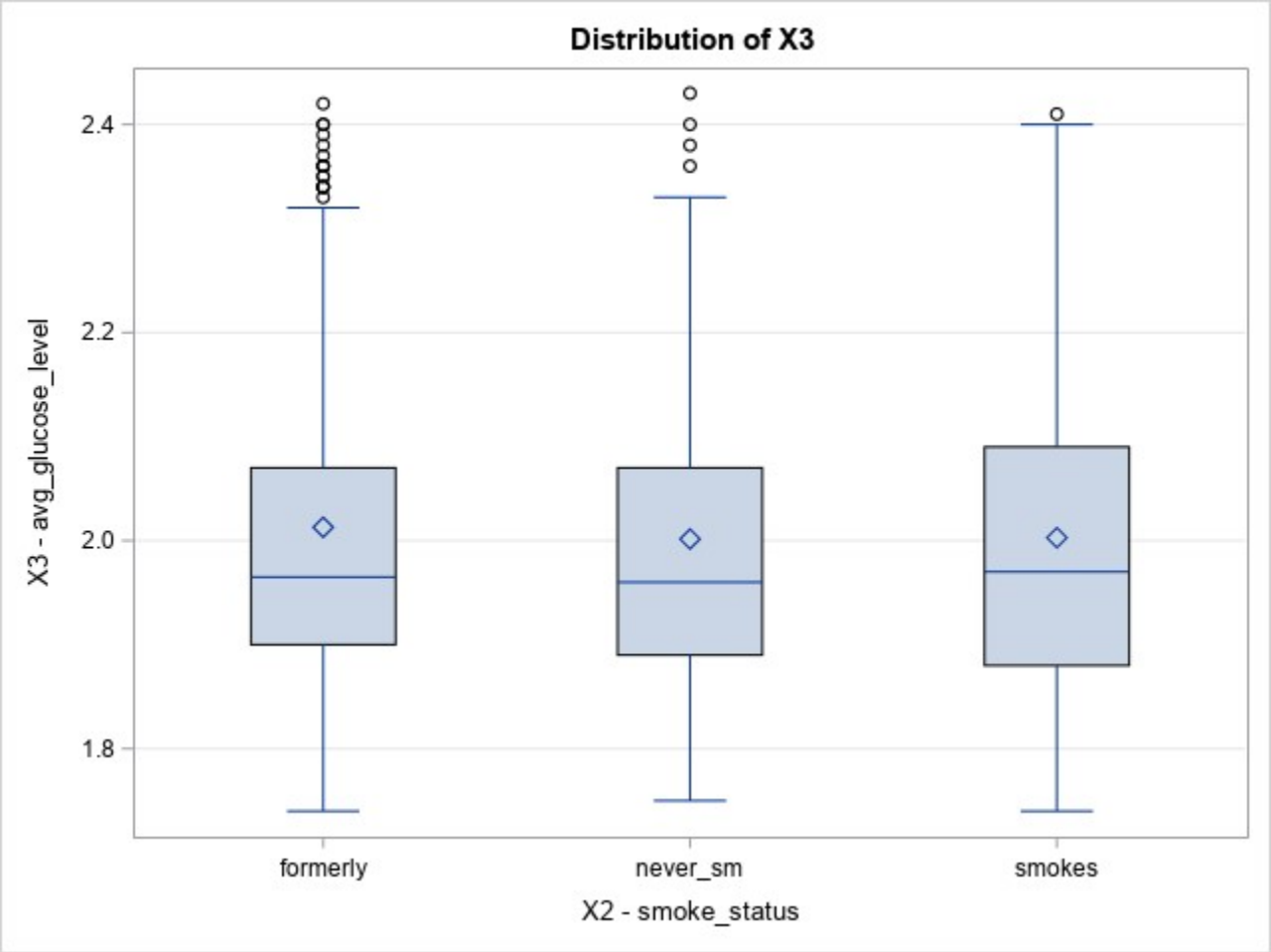
Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962
Critical Value of t	2.40315
Minimum Significant Difference	0.0478

Comparisons significant at the 0.05 level are indicated by *.**

X1 Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
Self-emp - Govt_job	0.04000	-0.00776	0.08776	
Self-emp - Private	0.05967	0.01191	0.10742	***
Govt_job - Self-emp	-0.04000	-0.08776	0.00776	
Govt_job - Private	0.01967	-0.02809	0.06742	
Private - Self-emp	-0.05967	-0.10742	-0.01191	***
Private - Govt_job	-0.01967	-0.06742	0.02809	

SAS Program-Homework

The GLM Procedure



SAS Program-Homework

The GLM Procedure

t Tests (LSD) for X3

Note: This test controls the Type I comparisonwise error rate, not the experimentwise error rate.

Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962
Critical Value of t	1.96536
Least Significant Difference	0.0391

Comparisons significant at the 0.05 level are indicated by *.**

X2 Comparison	Difference Between Means	95% Confidence Limits		
formerly - smokes	0.01000	-0.02906	0.04906	
formerly - never_sm	0.01127	-0.02779	0.05032	
smokes - formerly	-0.01000	-0.04906	0.02906	
smokes - never_sm	0.00127	-0.03779	0.04032	
never_sm - formerly	-0.01127	-0.05032	0.02779	
never_sm - smokes	-0.00127	-0.04032	0.03779	

SAS Program-Homework

The GLM Procedure

Bonferroni (Dunn) t Tests for X3

Note: This test controls the Type I experimentwise error rate, but it generally has a higher Type II error rate than Tukey's for all pairwise comparisons.

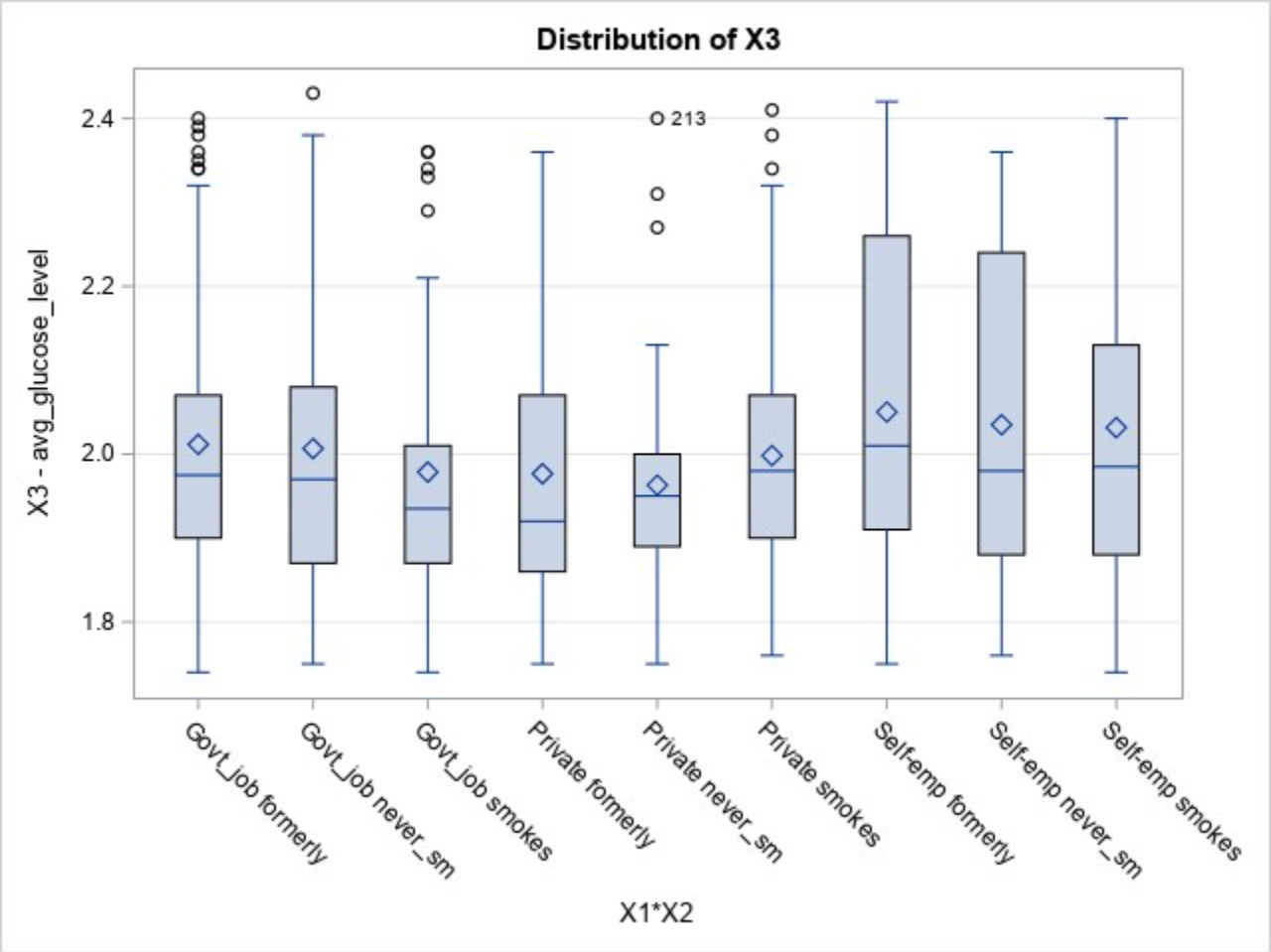
Alpha	0.05
Error Degrees of Freedom	441
Error Mean Square	0.02962
Critical Value of t	2.40315
Minimum Significant Difference	0.0478

Comparisons significant at the 0.05 level are indicated by *.**

X2 Comparison	Difference Between Means	Simultaneous 95% Confidence Limits		
formerly - smokes	0.01000	-0.03776	0.05776	
formerly - never_sm	0.01127	-0.03649	0.05902	
smokes - formerly	-0.01000	-0.05776	0.03776	
smokes - never_sm	0.00127	-0.04649	0.04902	
never_sm - formerly	-0.01127	-0.05902	0.03649	
never_sm - smokes	-0.00127	-0.04902	0.04649	

SAS Program-Homework

The GLM Procedure



Level of X1	Level of X2	N	X3	
			Mean	Std Dev
Govt_job	formerly	50	2.01160000	0.18915883
Govt_job	never_sm	50	2.00660000	0.16666733
Govt_job	smokes	50	1.97860000	0.16025503
Private	formerly	50	1.97660000	0.17698853
Private	never_sm	50	1.96300000	0.12368904
Private	smokes	50	1.99820000	0.16694971
Self-emp	formerly	50	2.05020000	0.18896593
Self-emp	never_sm	50	2.03500000	0.18479166
Self-emp	smokes	50	2.03160000	0.18161812