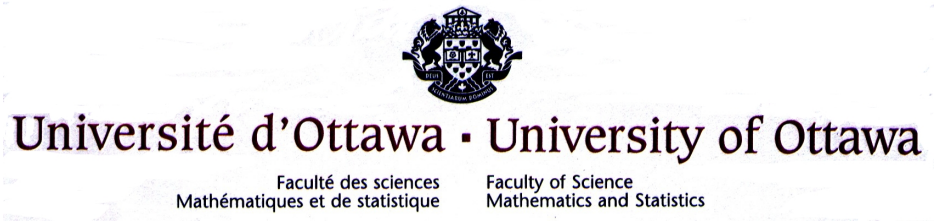

Practice Midterm for MAT 2379 (Fall 2017)
Introduction to biostatistics

Time: 80 minutes

Name: _____ Student Number: _____

You must sign below.

Cellular phones, unauthorized electronic devices or course notes are not allowed during this exam. Phones and devices must be turned off and put away in your bag. Do not keep them in your possession, such as in your pockets. If caught with such a device or document, the following may occur: you will be asked to leave immediately the exam and academic fraud allegations will be filed which may result in you obtaining a 0 (zero) for the exam.

By signing below, you acknowledge that you have ensured that you are complying with the above statement.

_____

This is a closed book examination. A formula sheet and some statistical tables are included with the exam. Only Faculty standard calculators are permitted. Record your answer to each question in the table below.

Submit your answers for the multiple choice questions in the following table.

Question	Answer	Question	Answer
1		4	
2		5	
3		6	

Multiple Choice Questions (1 point per question for a total of 6 points)

Please enter your choices for the multiple choice question in the table provided on the first page.

1. Canadian farmers grow a large quantity of genetically modified corn. About 70% of corn is genetically modified to be resistant to herbicides. Among the corn that are genetically modified to be resistant to herbicides, about 15% are genetically modified to be resistant to insects. Furthermore, among the corn that are not genetically modified to be resistant to herbicides, about 28.3% are genetically modified to be resistant to insects. What proportion of the corn are modified to be resistant to insects?

   A) 0.2565 B) 0.1899 C) 0.0523 D) 0.6873 E) 0.4323

2. Suppose that 34.5% of the population has blood group A. Furthermore, 4.9% of the population has blood group A and is Rh type negative. We select a person at random from this population, what is the probability that this person has blood group A and is not Rh type negative?

   A) 0.049 B) .2450 C) 0.3454 D) 0.9510 E) 0.2960

3. Let X be a discrete random variable with the following cumulative distribution function (cdf).

x	0	1	2	3
$F(x)$	0.1	0.45	0.65	1

   What is the expected value of X?

   A) 1.75 B) 1.25 C) 1.50 D) 1.80 E) 4.75

4. A simple urine test was developed for a particular disease. A study involved 200 patients with the disease and 100 patients without the disease. Among the patients with the disease 196 had a positive result, while there were only 8 positive results among the subjects without the disease. Give the specificity of the test.

   A) 0.08 B) 0.16 C) 0.98 D) 0.92 E) 0.25

5. In an experiment with an enriched feed mixture, eight chickens are born with the weights (in ounces) given below.

   $$61.4, 62.2, 66.9, 63.3, 66.2, 66.0, 63.5, 66.1$$

   Compute the sample mean and the sample standard deviation for this random sample of size $n = 8$.

   A) $\overline{x} = 64.45$; $s = 2.097$
   B) $\overline{x} = 64.45$; $s = 4.397$
   C) $\overline{x} = 64.45$; $s = 1.754$
   D) $\overline{x} = 63.25$; $s = 2.175$
   E) $\overline{x} = 63.25$; $s = 4.352$
   F) $\overline{x} = 63.25$; $s = 1.543$

6. In a study of alcoholics, it was found that 45% had alcoholic fathers and 6.5% had alcoholic mothers. Four percent had an alcoholic father and an alcoholic father mother. What is the probability that a randomly selected alcoholic will have an alcoholic mother if the father is alcoholic?

   A) 0.0650 B) 0.0777 A) 0.5757 A) 0.0889 A) 0.1255

Short Answer Questions (4 points per question for a total of 8 points)

1. [**4 points**] Suppose that 33% of seniors were smokers most of their adult life. It is known that 56% of the smokers have developed a lung condition and that 5.7% of the nonsmokers have developed a lung condition. Suppose that we select a senior at random.

   (a) What is the probability that the selected senior has a lung condition?

   (b) If the selected senior has a lung condition, what is the probability that the senior was a smoker for most of their adult life.

   (c) Are the events "developed a lung condition" and "smoker most of their adult life" independent? Justify your answer.

(Question 1 cont.)

2. [**4 points**] Assume that the diameter at breast height (in meters) of a sequoia tree is a normal random variable with mean 7.5 m and standard deviation 0.5 m.

   (a) Compute the probability that a sequoia tree will have a diameter at breast height that is larger than 9 m.

   (b) Compute the probability that a sequoia tree will have a diameter at breast height that is between 7 m and 9 m.

   (c) Find a value c such that 75% of the sequoia tree will have a diameter at breast height larger than c.

   (d) We select 6 sequoia trees at random, compute that probability that at least 5 of the 6 trees are going to have a diameter at breast height that is smaller than 9 m.

(Question 2 cont.)

Cumulative distribution function for $N(0,1)$: $\Phi(z) = P(Z \leq z)$

0.09	0.08	0.07	0.06	0.05	0.04	0.03	0.02	0.01	0.00	z
.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	−3.8
.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	−3.7
.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0002	.0002	−3.6
.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	−3.5
.0002	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	−3.4
.0003	.0004	.0004	.0004	.0004	.0004	.0004	.0005	.0005	.0005	−3.3
.0005	.0005	.0005	.0006	.0006	.0006	.0006	.0006	.0007	.0007	−3.2
.0007	.0007	.0008	.0008	.0008	.0008	.0009	.0009	.0009	.0010	−3.1
.0010	.0010	.0011	.0011	.0011	.0012	.0012	.0013	.0013	.0013	−3.0
.0014	.0014	.0015	.0015	.0016	.0016	.0017	.0018	.0018	.0019	−2.9
.0019	.0020	.0021	.0021	.0022	.0023	.0023	.0024	.0025	.0026	−2.8
.0026	.0027	.0028	.0029	.0030	.0031	.0032	.0033	.0034	.0035	−2.7
.0036	.0037	.0038	.0039	.0040	.0041	.0043	.0044	.0045	.0047	−2.6
.0048	.0049	.0051	.0052	.0054	.0055	.0057	.0059	.0060	.0062	−2.5
.0064	.0066	.0068	.0069	.0071	.0073	.0075	.0078	.0080	.0082	−2.4
.0084	.0087	.0089	.0091	.0094	.0096	.0099	.0102	.0104	.0107	−2.3
.0110	.0113	.0116	.0119	.0122	.0125	.0129	.0132	.0136	.0139	−2.2
.0143	.0146	.0150	.0154	.0158	.0162	.0166	.0170	.0174	.0179	−2.1
.0183	.0188	.0192	.0197	.0202	.0207	.0212	.0217	.0222	.0228	−2.0
.0233	.0239	.0244	.0250	.0256	.0262	.0268	.0274	.0281	.0287	−1.9
.0294	.0301	.0307	.0314	.0322	.0329	.0336	.0344	.0351	.0359	−1.8
.0367	.0375	.0384	.0392	.0401	.0409	.0418	.0427	.0436	.0446	−1.7
.0455	.0465	.0475	.0485	.0495	.0505	.0516	.0526	.0537	.0548	−1.6
.0559	.0571	.0582	.0594	.0606	.0618	.0630	.0643	.0655	.0668	−1.5
.0681	.0694	.0708	.0721	.0735	.0749	.0764	.0778	.0793	.0808	−1.4
.0823	.0838	.0853	.0869	.0885	.0901	.0918	.0934	.0951	.0968	−1.3
.0985	.1003	.1020	.1038	.1056	.1075	.1093	.1112	.1131	.1151	−1.2
.1170	.1190	.1210	.1230	.1251	.1271	.1292	.1314	.1335	.1357	−1.1
.1379	.1401	.1423	.1446	.1469	.1492	.1515	.1539	.1562	.1587	−1.0
.1611	.1635	.1660	.1685	.1711	.1736	.1762	.1788	.1814	.1841	−0.9
.1867	.1894	.1922	.1949	.1977	.2005	.2033	.2061	.2090	.2119	−0.8
.2148	.2177	.2206	.2236	.2266	.2296	.2327	.2358	.2389	.242	−0.7
.2451	.2483	.2514	.2546	.2578	.2611	.2643	.2676	.2709	.2743	−0.6
.2776	.2810	.2843	.2877	.2912	.2946	.2981	.3015	.3050	.3085	−0.5
.3121	.3156	.3192	.3228	.3264	.3300	.3336	.3372	.3409	.3446	−0.4
.3483	.3520	.3557	.3594	.3632	.3669	.3707	.3745	.3783	.3821	−0.3
.3859	.3897	.3936	.3974	.4013	.4052	.4090	.4129	.4168	.4207	−0.2
.4247	.4286	.4325	.4364	.4404	.4443	.4483	.4522	.4562	.4602	−0.1
.4641	.4681	.4721	.4761	.4801	.4840	.4880	.4920	.4960	.5000	−0.0

Cumulative distribution function for $N(0,1)$: $\Phi(z) = P(Z \leq z)$

z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	.5000	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359
0.1	.5398	.5438	.5478	.5517	.5557	.5596	.5636	.5675	.5714	.5753
0.2	.5793	.5832	.5871	.5910	.5948	.5987	.6026	.6064	.6103	.6141
0.3	.6179	.6217	.6255	.6293	.6331	.6368	.6406	.6443	.6480	.6517
0.4	.6554	.6591	.6628	.6664	.6700	.6736	.6772	.6808	.6844	.6879
0.5	.6915	.6950	.6985	.7019	.7054	.7088	.7123	.7157	.7190	.7224
0.6	.7257	.7291	.7324	.7357	.7389	.7422	.7454	.7486	.7517	.7549
0.7	.7580	.7611	.7642	.7673	.7704	.7734	.7764	.7794	.7823	.7852
0.8	.7881	.7910	.7939	.7967	.7995	.8023	.8051	.8078	.8106	.8133
0.9	.8159	.8186	.8212	.8238	.8264	.8289	.8315	.8340	.8365	.8389
1.0	.8413	.8438	.8461	.8485	.8508	.8531	.8554	.8577	.8599	.8621
1.1	.8643	.8665	.8686	.8708	.8729	.8749	.8770	.8790	.8810	.8830
1.2	.8849	.8869	.8888	.8907	.8925	.8944	.8962	.8980	.8997	.9015
1.3	.9032	.9049	.9066	.9082	.9099	.9115	.9131	.9147	.9162	.9177
1.4	.9192	.9207	.9222	.9236	.9251	.9265	.9279	.9292	.9306	.9319
1.5	.9332	.9345	.9357	.9370	.9382	.9394	.9406	.9418	.9429	.9441
1.6	.9452	.9463	.9474	.9484	.9495	.9505	.9515	.9525	.9535	.9545
1.7	.9554	.9564	.9573	.9582	.9591	.9599	.9608	.9616	.9625	.9633
1.8	.9641	.9649	.9656	.9664	.9671	.9678	.9686	.9693	.9699	.9706
1.9	.9713	.9719	.9726	.9732	.9738	.9744	.9750	.9756	.9761	.9767
2.0	.9772	.9778	.9783	.9788	.9793	.9798	.9803	.9808	.9812	.9817
2.1	.9821	.9826	.9830	.9834	.9838	.9842	.9846	.9850	.9854	.9857
2.2	.9861	.9864	.9868	.9871	.9875	.9878	.9881	.9884	.9887	.9890
2.3	.9893	.9896	.9898	.9901	.9904	.9906	.9909	.9911	.9913	.9916
2.4	.9918	.9920	.9922	.9925	.9927	.9929	.9931	.9932	.9934	.9936
2.5	.9938	.9940	.9941	.9943	.9945	.9946	.9948	.9949	.9951	.9952
2.6	.9953	.9955	.9956	.9957	.9959	.9960	.9961	.9962	.9963	.9964
2.7	.9965	.9966	.9967	.9968	.9969	.9970	.9971	.9972	.9973	.9974
2.8	.9974	.9975	.9976	.9977	.9977	.9978	.9979	.9979	.9980	.9981
2.9	.9981	.9982	.9982	.9983	.9984	.9984	.9985	.9985	.9986	.9986
3.0	.9987	.9987	.9987	.9988	.9988	.9989	.9989	.9989	.9990	.9990
3.1	.9990	.9991	.9991	.9991	.9992	.9992	.9992	.9992	.9993	.9993
3.2	.9993	.9993	.9994	.9994	.9994	.9994	.9994	.9995	.9995	.9995
3.3	.9995	.9995	.9995	.9996	.9996	.9996	.9996	.9996	.9996	.9997
3.4	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9997	.9998
3.5	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998	.9998
3.6	.9998	.9998	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999
3.7	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999
3.8	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999	.9999