STAT 371 Exam 1   NetID (mine is "jgillett" from "jgillett@wisc.edu"): _____

Last name: _____   First name: _____

Discussion (check one):

- Lecture 371-001 TuTh 9:30-10:45 Microbial Sciences 1520:

    ____ 311 Tu 1:20-2:10 Engineering Hall 2317 Kent, Sean and Mu, Yuqin

    ____ 312 Tu 2:25-3:15 Mechanical Engineering 1153 Kent, Sean and Mu, Yuqin

    ____ 313 We 11:00-11:50 Van Hise 594 Xu, Yuqing and Zhu, Rongjun "Alex"

- Lecture 371-002 TuTh 11:00-12:15 Ingraham Hall 19:

    ____ 321 We 12:05-12:55 Van Hise 594 Xu, Yuqing and Bobst, Claire

    ____ 322 Tu 2:25-3:15 Nutritional Sciences 290 Zhang, Chengning and Huang, Kunling

   ____ 323 We 8:50-9:40 Van Hise 494 Zhang, Chengning and Huang, Kunling

Instructions:

1. Do not open the exam until I say "go."

2. Put away everything except a pencil, a calculator, and your one-page (two sides) notes sheet.

3. Show your work. Correct answers without enough work may receive no credit.

4. Find the required table(s) at the end of the packet. You may tear the tables sheet(s) free.

5. If a question is ambiguous, resolve the ambiguity in writing. We will consider grading accordingly.

6. The exam ends when I call time. If you continue writing after I call time, you risk a penalty. (The alternative, that you get more time than your peers, is unfair.)

7. You are welcome to turn your exam in to me before I call time. However, if you are still here in the last five minutes, please remain seated until I've called time.

Question	Points	Deduction
Q1	10	
Q2	20	
Q3	40	
Q4	20	
Q5	10	
Total	100	

1

1. Answer the questions about graphical summaries, below.

   (a) Consider the graphs, below.

1

A

2

B

3

C
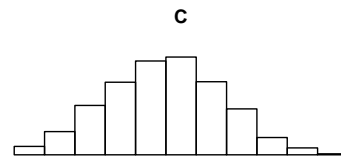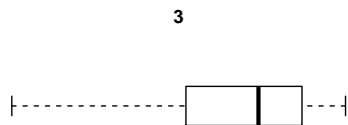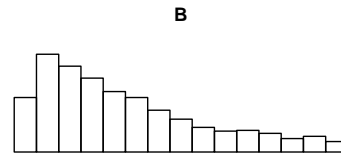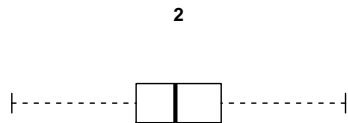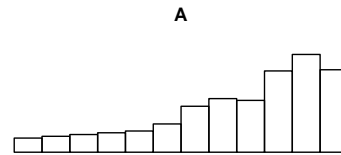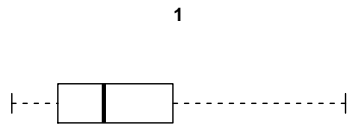
   i. Which histogram corresponds to boxplot 1? _____
   ii. Which histogram corresponds to boxplot 2? _____
   iii. Which histogram corresponds to boxplot 3? _____

   (b) Consider the graphs, below.

A

B
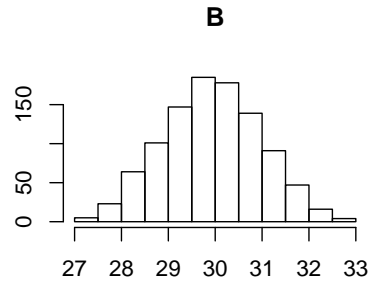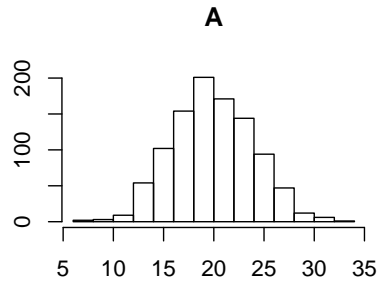
   i. For which sample is the mean the largest? _____
   ii. For which sample is the standard deviation the largest? _____
   iii. For which sample is the median the largest? _____
   iv. For which sample is the interquartile range the largest? _____

2. A high school student applies to seven colleges, each of which makes an admission decision by rolling a fair six-sided die and admitting a student if a 1 is rolled.

   (a) What is the probability the student will be admitted to exactly two colleges?

   (b) What is the expected number of colleges to which the student will be admitted?

3. A baking mix includes one cup of white wheat flour, one cup of buckwheat flour, and two cups of whole wheat flour. Each of these four cups is measured from large bins randomly and independently. (Hint: Two different cups of whole wheat flour are measured, one after the other, not two copies of one cup.) For each of the ingredients, one cup has these amounts of fiber (in grams):

ingredient (1 cup)	mean fiber weight (g)	standard deviation of fiber weight (g)
white wheat flour	3	0.1
buckwheat flour	17	0.3
whole wheat flour	13	0.2

(a) Find the mean amount of fiber in a four-cup package of baking mix.

(b) Find the standard deviation of the amount of fiber in a package.

(Here is the buckwheat information again:

ingredient (1 cup)	mean fiber weight (g)	standard deviation of fiber weight (g)
buckwheat flour	17	0.3

)

(c) 100 packages are randomly selected and packed in a carton for shipping. Find the probability the total amount of fiber *from buckwheat* in the carton is more than 1703 g.

(d) Suppose the amount of fiber in 1 cup of buckwheat flour is normally distributed. One package of baking mix is randomly selected. Find the probability the amount of fiber *from buckwheat* in the package is more than 1703 g.

4. A tea-bagging factory took a simple random sample of 42 tea bags from the day's production and weighed each bag, finding a sample mean weight of 2.11 grams. Long experience with bag weights indicated that the population standard deviation is about 0.06 grams.

   (a) Find a 99.6% confidence interval for the population average weight of the day's tea bags. Express it in the format "interval center ± error margin."

   (b) Would a 95% confidence interval calculated from the same data be narrower or wider than the 99.6% interval? Explain. (Hint: No calculation is necessary. You are welcome to do calculations if you wish.)
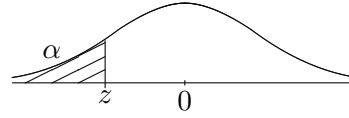
   (c) What sample size is required to get an error margin of 0.02?

5. Let X be the number of dots facing up on an unfair four-sided die after it is rolled. The probability mass function of X is

| x	1	2	3	4
$p(x)$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{3}$	$\frac{1}{6}$

Find the expected value (or mean) of X.

For $z = a.bc$, look in row $a.b$ and column $.0c$ to find $P(Z < z)$. e.g.
For $z = 1.42$, look in row 1.4 and column .02 to find $P(Z < 1.42) = .9222$ (on next page).

Cumulative $N(0,1)$ Distribution, $z \leq 0$

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-3.6	.0002	.0002	.0001	.0001	.0001	.0001	.0001	.0001	.0001	.0001
-3.5	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002	.0002
-3.4	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0003	.0002
-3.3	.0005	.0005	.0005	.0004	.0004	.0004	.0004	.0004	.0004	.0003
-3.2	.0007	.0007	.0006	.0006	.0006	.0006	.0006	.0005	.0005	.0005
-3.1	.0010	.0009	.0009	.0009	.0008	.0008	.0008	.0008	.0007	.0007
-3.0	.0013	.0013	.0013	.0012	.0012	.0011	.0011	.0011	.0010	.0010
-2.9	.0019	.0018	.0018	.0017	.0016	.0016	.0015	.0015	.0014	.0014
-2.8	.0026	.0025	.0024	.0023	.0023	.0022	.0021	.0021	.0020	.0019
-2.7	.0035	.0034	.0033	.0032	.0031	.0030	.0029	.0028	.0027	.0026
-2.6	.0047	.0045	.0044	.0043	.0041	.0040	.0039	.0038	.0037	.0036
-2.5	.0062	.0060	.0059	.0057	.0055	.0054	.0052	.0051	.0049	.0048
-2.4	.0082	.0080	.0078	.0075	.0073	.0071	.0069	.0068	.0066	.0064
-2.3	.0107	.0104	.0102	.0099	.0096	.0094	.0091	.0089	.0087	.0084
-2.2	.0139	.0136	.0132	.0129	.0125	.0122	.0119	.0116	.0113	.0110
-2.1	.0179	.0174	.0170	.0166	.0162	.0158	.0154	.0150	.0146	.0143
-2.0	.0228	.0222	.0217	.0212	.0207	.0202	.0197	.0192	.0188	.0183
-1.9	.0287	.0281	.0274	.0268	.0262	.0256	.0250	.0244	.0239	.0233
-1.8	.0359	.0351	.0344	.0336	.0329	.0322	.0314	.0307	.0301	.0294
-1.7	.0446	.0436	.0427	.0418	.0409	.0401	.0392	.0384	.0375	.0367
-1.6	.0548	.0537	.0526	.0516	.0505	.0495	.0485	.0475	.0465	.0455
-1.5	.0668	.0655	.0643	.0630	.0618	.0606	.0594	.0582	.0571	.0559
-1.4	.0808	.0793	.0778	.0764	.0749	.0735	.0721	.0708	.0694	.0681
-1.3	.0968	.0951	.0934	.0918	.0901	.0885	.0869	.0853	.0838	.0823
-1.2	.1151	.1131	.1112	.1093	.1075	.1056	.1038	.1020	.1003	.0985
-1.1	.1357	.1335	.1314	.1292	.1271	.1251	.1230	.1210	.1190	.1170
-1.0	.1587	.1562	.1539	.1515	.1492	.1469	.1446	.1423	.1401	.1379
-0.9	.1841	.1814	.1788	.1762	.1736	.1711	.1685	.1660	.1635	.1611
-0.8	.2119	.2090	.2061	.2033	.2005	.1977	.1949	.1922	.1894	.1867
-0.7	.2420	.2389	.2358	.2327	.2296	.2266	.2236	.2206	.2177	.2148
-0.6	.2743	.2709	.2676	.2643	.2611	.2578	.2546	.2514	.2483	.2451
-0.5	.3085	.3050	.3015	.2981	.2946	.2912	.2877	.2843	.2810	.2776
-0.4	.3446	.3409	.3372	.3336	.3300	.3264	.3228	.3192	.3156	.3121
-0.3	.3821	.3783	.3745	.3707	.3669	.3632	.3594	.3557	.3520	.3483
-0.2	.4207	.4168	.4129	.4090	.4052	.4013	.3974	.3936	.3897	.3859
-0.1	.4602	.4562	.4522	.4483	.4443	.4404	.4364	.4325	.4286	.4247
-0.0	.5000	.4960	.4920	.4880	.4840	.4801	.4761	.4721	.4681	.4641
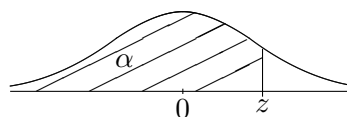
Cumulative $N(0,1)$ Distribution, $z \geq 0$

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.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