



University of Connecticut
Department of Mathematics

MATH 1070Q

EXAM 2A

FALL 2017

NAME: _____

TA Name: _____ Discussion: _____

Read This First!

- This is a closed notes, closed book exam. You cannot receive aid on this exam from anyone else - No sharing of calculators! Make sure your exam has **20** questions and an answer sheet.
- Only scientific calculators are allowed on this exam.
- For each question, be sure to indicate your answer by **both** writing it in the table provided at the end **and** circling your answer choice as well. If we cannot determine your final answer, you may not receive any credit.
- **Unless otherwise stated you must show work on every question to receive credit! This may consist of written work, an explanation of your thought process, etc.**
- If part of the solution is written outside the space provided, then clearly indicate this.
- If you finish this exam early, check all your answers before handing in your copy. Once a copy is handed in, it cannot be taken back.
- You may use the back of the page as scratch paper. If you write your solution in this space you must indicate this on the page and on the question.

1. A company produces robotic arms. Due to manufacturing errors the length of the casings for these arms are normally distributed with a mean of 65 cm. A casing is rejected if its more than 2.34 standard deviations above the mean or more than 1.23 standard deviation below the mean. What percentage of arm casings are rejected?
 - (a) 11.89%
 - (b) 9.97%
 - (c) 10.93%
 - (d) Not enough information to tell.
2. Let Z be a random variable with a standard normal distribution. Which of the following statements must be true?
 - (a) $P(Z \leq a) \leq .5$
 - (b) $P(Z \leq -a) = P(Z \geq a)$
 - (c) $P(Z \geq a) = 1 + P(Z \leq a)$
 - (d) None of the above statements are true.
3. Find the demand equation if a company sells 10 items for \$8 and 15 items for \$6. Assume the demand changes linearly.
 - (a) $p = 8x + 10$
 - (b) $p = -8x + 10$
 - (c) $p = -0.4x + 12$
 - (d) $p = 0.4x + 4$
4. Robert Kraft bought the New England Patriots for \$175 million in 1992. In 2017, the franchise is now worth \$3.2 billion. In 1992, if Kraft had instead invested the \$175 million into an account earning simple interest, what annual interest rate would the account have needed to earn in order for him to have \$3.2 billion in the account today?
 - (a) 25.2%
 - (b) 58.4%
 - (c) 3.3%
 - (d) 69.14%

5. Suppose that you have \$5,000 to invest as a lump sum for 10 years and you have 3 possible accounts that you can open:

- Account 1 earns an annual simple interest rate of 2.15%
- Account 2 earns an annual interest rate of 2.0% compounded quarterly
- Account 3 earns an annual interest rate of 1.9% compounded daily

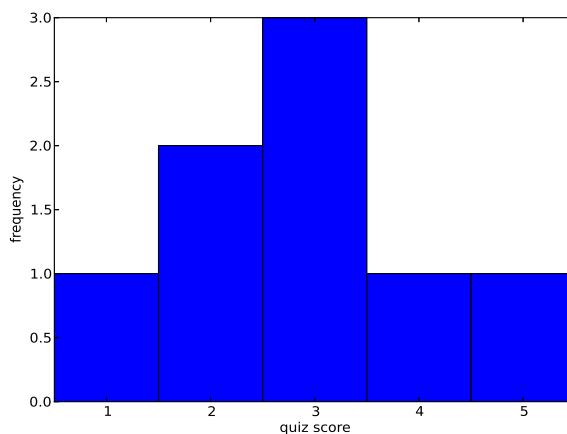
Order the account options from greatest (highest future value) to least (lowest future value):

- (a) 3,1,2
 - (b) 1,2,3
 - (c) 2,3,1
 - (d) 2,1,3
6. Let $S_1 = \{67, 67, 68, 70\}$ and $S_2 = \{62, 64, 70, 76\}$ be two sets of data. Which of the following statements is true?
- (a) Both S_1 and S_2 have the same mean but S_2 has a larger variance.
 - (b) Both S_1 and S_2 have the same mean but S_1 has a larger variance.
 - (c) Both data sets have different means and variances.
 - (d) None of the above statements are true.
7. Public transportation in a city offers the following two plans: Either pay \$4 per trip, or pay \$10 for a membership that gives you a \$2 discount per trip. What number of trips will make the two options cost the same amount?
- (a) 5 trips
 - (b) 3 trips
 - (c) 10 trips
 - (d) They will never be equal.
8. A bank advertises an account with an annual interest rate of 6.42% compounded daily. What is the effective yield of this account?
- (a) 6.40%
 - (b) 6.61%
 - (c) 6.63%
 - (d) 6.58%

9. Below is a probability distribution table for a random variable X . Find the variance of the random variable, $\text{Var}(X)$.

x	-30	-10	0	5	10	20
$P(X=x)$	0.15	0.25	0.05	0.10	0.25	0.20

- (a) 0
 (b) -52.7
 (c) 267.5
 (d) 16.3554
10. A section of MATH 1070Q has 8 students. Below is a histogram of their quiz scores out of 5 points.



What is the average score?

- (a) 4.6
 (b) 2.875
 (c) 3
 (d) Not enough information to tell.
11. Suppose that we invest \$550 into an account at the end of each quarter in order to save for a swimming pool. If the account has an annual interest rate of 4.1% compounded quarterly, what is the future value of the account after 4 years? (Round your answer to the nearest whole dollar).
- (a) \$10,292
 (b) \$8,078
 (c) \$9,510
 (d) \$6,500

12. A couple will need \$25,000 at the end of 4 years to purchase a new mini-van. How much should they place at the end of each month into a savings account earning an annual rate of 3.2% compounded monthly to meet this goal? (Round your answer to the nearest whole dollar).
- (a) \$220
 - (b) \$489
 - (c) \$556
 - (d) \$59
13. If $C(x) = 3x + 6$ and $R(x) = 4x$, find the break even quantity.
- (a) $x = 2$
 - (b) $x = 4$
 - (c) $x = 5$
 - (d) $x = 6$
14. After the semester, you decide to give your professor a gift in the form of a 10 year bond with an annual interest rate of 5.1% compounded weekly. The bond says that it will be worth \$10,000 in 10 years. What is the gift worth to the professor at the present time? (Round your answer to the nearest whole dollar).
- (a) \$6,006
 - (b) \$6,623
 - (c) \$6,011
 - (d) \$6,001
15. The following table gives the average monthly temperatures for two cities for four selected months.

Month	Jan.	Apr.	Jul.	Oct.
San Diego	65	68	76	75
Chicago	29	59	83	64

Which city has the largest variance in its temperature for the four months displayed?

- (a) They have equal variance.
- (b) San Diego
- (c) Chicago
- (d) Not enough information to tell.

16. Scores on an intelligence test are normally distributed with a mean of 100 and a standard deviation of 15. What is the percentage of people with an intelligence test score between 95 and 105?
- (a) 74.14%
 - (b) 37.07%
 - (c) 62.93%
 - (d) 25.86 %
17. If you purchase a car new for \$20,000 and it depreciates linearly at \$1,500 per year, find the value after 6 years.
- (a) \$20,000
 - (b) \$9,000
 - (c) \$11,000
 - (d) \$1,500
18. If the demand equation is $p = 12 - x$ and the supply equation is $p = 3x + 2$, find the market equilibrium point.
- (a) $(x, p) = (2, 10)$
 - (b) $(x, p) = (2.5, 9.5)$
 - (c) $(x, p) = (3.5, 8.5)$
 - (d) $(x, p) = (4, 10)$
19. Find the deposit needed today in order to yield a pension payment of \$50,000 per year for the next 30 years. Assume the annual interest rate is 6% and round to the nearest dollar.
- (a) \$3,321,941
 - (b) \$688,242
 - (c) \$750,000
 - (d) \$642,888
20. A homeowner has just made the 24th payment on their \$150,000 30-year fixed rate mortgage, with an interest rate of 4% compounding monthly. How much principal do they have remaining? Round your answer to the nearest dollar.
- (a) \$100,145
 - (b) \$144,609
 - (c) \$132,813
 - (d) \$150,000

EXAM 2A ANSWER SHEET

NAME: _____

TA Name: _____ Discussion: _____

Instructions: Record your answers in the following tables.

Question	Answer
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

Question	Answer
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	

Formula Sheet

Simple Interest

$$F = P(1 + rt)$$

Compound interest

$$F = P \left(1 + \frac{r}{m}\right)^{mt}$$

$$r_{eff} = \left(1 + \frac{r}{m}\right)^m - 1$$

Ordinary Annuities

$$FV = PMT \times \frac{\left(1 + \left(\frac{r}{m}\right)\right)^{mt} - 1}{\left(\frac{r}{m}\right)}$$

$$PV = PMT \times \frac{1 - \left(1 + \frac{r}{m}\right)^{-mt}}{\left(\frac{r}{m}\right)}$$

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

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
-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	.0006	.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	.5040	.5080	.5120	.5160	.5199	.5239	.5279	.5319	.5359