Math 3680 Practice Exam

Due to large enrollment, the exams in Math 3680 will be either partially or entirely in a multiple-choice format. To get used to this format, I have provided this practice exam. The questions on this exam are nearly identical to questions that have appeared on the homework.

This is not intended to be a comprehensive review of all topics that could appear on the first exam. Rather, this is meant to give you practice with the format of the multiple-choice exam, so that you're familiar with the format on the day of the test.

- On the Tuesday before the exam, I will pass out blank scantrons to the class so that you can fill in the bubbles for your name ahead of time. If you are absent on that Tuesday or else forget to bring the scantron back, I will have extra blank scantrons available on the day of the test.

- A few minutes before the test begins, I will pass out the exams. Each exam will have a unique ID number on the front cover corresponding to the questions that appear on your exam. Before the test begins, you will be asked to bubble in that number in the section of the scantron marked "IDENTIFICATION NUMBER." However, you will not be allowed to actually open the test and start working until class starts.

Please visit the class website (http://www.math.unt.edu/~johnq/Courses/2012fall/3680) for another review of the first exam as well as links to YouTube videos giving the solutions for that review.

Problem 1 Sometimes a multiple-choice question will ask which interval the answer lies in. For example:

Let $x = 27$. Then x lies in the range

A. $[0, 10)$

B. $[10, 15)$

C. $[15, 20)$

D. $[20, 25)$

E. $[25, \infty)$

Problem 2 Let $x = 15$. Then x lies in the range

A. $[0, 10)$

B. $[10, 15)$

C. $[15, 20)$

D. $[20, 25)$

E. $[25, \infty)$

Problem 3 Other problems may ask for a certain digit of an answer. For example:

Let $x = 12.345$. Then the first digit after the decimal point is

A. 0 or 1

B. 2 or 3

C. 4 or 5

D. 6 or 7

E. 8 or 9

Problem 4 Let $x = 12.345$. Then the second digit after the decimal point is

A. 0 or 1

B. 2 or 3

C. 4 or 5

D. 6 or 7

E. 8 or 9

Consider the following observations on shear strength (MPa) of a joint bonded in a particular manner.

$$4.4 \quad 16.4 \quad 21.8 \quad 30.0 \quad 33.1 \quad 36.6 \quad 40.4 \quad 66.7 \quad 72.0 \quad 81.5 \quad 108.4$$

Problem 5 Let x be the lower fourth. Then x is in the range

A. $[0, 20)$

B. $[20, 22.5)$

C. $[22.5, 25)$

D. $[25, 27.5)$

E. $[27.5, \infty)$

Problem 6 Let y be the upper fourth. Then y is in the range

A. $[0, 60)$

B. $[60, 62.5)$

C. $[62.5, 65)$

D. $[65, 67.5)$

E. $[67.5, \infty)$

Problem 7 The value of f_s is in the range:

A. $[37.5, 40)$

B. $[40, 42.5)$

C. $[42.5, 45)$

D. $[45, 47.5)$

E. $[47.5, \infty)$

Problem 8 Let z be the amount that the largest observation could be decreased without affecting f_s. When writing out z as a decimal, the first digit after the decimal point is

A. 0 or 1

B. 2 or 3

C. 4 or 5

D. 6 or 7

E. 8 or 9

Problem 9 Temperature transducers of a certain type are shipped in batches of 50. A sample of 60 batches was selected, and the number of transducers in each batch not conforming to design specifications was determined, resulting in the following data:

1, 1, 2, 3, 0, 1, 3, 2, 0, 5, 3, 3, 1, 3, 2, 4, 7, 0, 2, 3, 0, 4, 2, 1, 3, 1, 1, 3, 4, 1, 2, 3, 2, 2, 8, 4, 4, 1, 3, 1, 5, 0, 2, 3, 2, 1, 0, 6, 4, 2, 1, 6, 0, 3, 3, 3, 6, 1, 2, 3

Let x be the proportion of batches in the sample that have at most six nonconforming transducers. When writing out x as a decimal, the third digit after the decimal point is

A. 0 or 1

B. 2 or 3

C. 4 or 5

D. 6 or 7

E. 8 or 9

Problem 10 A woman sued a computer keyboard manufacturer, charging that her repetitive stress injuries were caused by the keyboard. The injury awarded about $3.5 million for pain and suffering, but the court then set aside that award as being unreasonable compensation. In making this determination, the court identified a "normative" group of 27 similar cases and specified a reasonable award as one within two standard deviations of the mean of the awards in the 27 cases. The 27 awards were (in $1000s) 37, 60, 71, 112, 135, 145, 149, 152, 238, 290, 340, 410, 600, 750, 750, 750, 1050, 1100, 1137, 1150, 1200, 1200, 1250, 1577, 1700, 1825, and 2000, from which $\sum x_i = 20,178$, $\sum x_i^2 = 24,656,876$. What is the maximum possible amount (in $1000s) that could be awarded under the two-standard-deviation rule?

A. $[0, 2000)$

B. $[2000, 2050)$

C. $[2050, 2100)$

D. $[2100, 2150)$

E. $[2150, \infty)$

The minimum injection pressure (psi) for injection molding specimens of high amylose corn was determined for eight different specimens (higher pressure corresponds to greater processing difficulty), resulting in the following observations.

$$14.7, \ 12.5, \ 17.6, \ 14.1, \ 12.0, \ 11.0, \ 9.5, \ 8.2$$

Problem 11 The median is in the range:

A. $[12, 12.1)$

B. $[12.1, 12.2)$

C. $[12.2, 12.3)$

D. $[12.3, 12.4)$

E. $[12.4, 12.5)$

Problem 12 The mean is in the range:

A. $[12, 12.1)$

B. $[12.1, 12.2)$

C. $[12.2, 12.3)$

D. $[12.3, 12.4)$

E. $[12.4, 12.5)$

Problem 13 Let x be the 12.5% trimmed mean. When writing out x as a decimal, the first digit after the decimal point is

A. 0 or 1

B. 2 or 3

C. 4 or 5

D. 6 or 7

E. 8 or 9

Problem 14 Which statement is correct?

A. The median is much larger than the mean and trimmed mean, indicating positive skewness.

B. The mean is much larger than the median and trimmed mean, indicating positive skewness.

C. The median is much larger than the mean and trimmed mean, indicating negative skewness.

D. The mean is much larger than the median and trimmed mean, indicating negative skewness.

E. All three measures of center are similar, indicating little skewness to the data set.

Problem 15 Suppose we want the values of the sample mean and median when the observations are expressed in kilograms per square inch (ksi) rather than psi. Is it necessary to reexpress each observation in ksi, or can the previous values be used directly? [Hint: 1 kg = 2.2 lb.]

A. Yes, it is necessary to reexpress each observation.

B. No, the previous values can be used directly.

Consider randomly selecting a student at a certain university, and let A denote the event that the selected individual has a Visa credit card and B be the analogous event for a MasterCard. Suppose that $P(A) = 0.6$, $P(B) = 0.5$, and $P(A \cap B) = 0.35$.

Problem 16 The probability that the selected individual has at least one of the two types of cards is in the range

A. $[0.65, 0.7)$

B. $[0.7, 0.75)$

C. $[0.75, 0.8)$

D. $[0.8, 0.85)$

E. $[0.85, 0.9)$

Problem 17 The probability that the selected individual has neither type of card is in the range

A. $[0, 0.05)$

B. $[0.05, 0.1)$

C. $[0.1, 0.15)$

D. $[0.15, 0.2)$

E. $[0.2, 1)$

Problem 18 Describe, in terms of A and B, the event that the selected student has a Visa card but not a MasterCard.

A. $A \cup B'$

B. $A \cap B'$

C. $A' \cap B'$

D. $A' \cup B'$

E. $A' \cap B$

Problem 19 The probability the selected student has a Visa Card but not a MasterCard is in the range:

A. $[0.1, 0.15)$

B. $[0.15, 0.2)$

C. $[0.2, 0.25)$

D. $[0.25, 0.3)$

E. $[0.3, 1)$

A family consisting of three persons — A, B, and C — goes to a medical clinic that always has a doctor at each of stations 1, 2, and 3. During a certain week, each member of the family visits the clinic once and is assigned at random to a station. The experiment consists of recording the station number for each member. Suppose that any incoming individual is equally likely to be assigned to any of the three stations irrespective of where other individuals have been assigned.

Problem 20 Let x be the probability that all three family members are assigned to the same station. When writing x as a decimal, the second digit after the decimal point is

  A. 0 or 1

  B. 2 or 3

  C. 4 or 5

  D. 6 or 7

  E. 8 or 9

Problem 21 Let y be the probability that at most two family members are assigned to the same station. When writing y as a decimal, the second digit after the decimal point is

  A. 0 or 1

  B. 2 or 3

  C. 4 or 5

  D. 6 or 7

  E. 8 or 9

Problem 22 Let z be the probability that every family member is assigned to a different station. When writing z as a decimal, the second digit after the decimal point is

  A. 0 or 1

  B. 2 or 3

  C. 4 or 5

  D. 6 or 7

  E. 8 or 9

Answers

1. E

2. C (note: 15 is in range C and not B)

3. B (answer: 3)

4. C (answer: 4)

5. D (answer: 25.90)

6. E (answer: 69.35)

7. C (answer: 43.45)

8. C (answer: 36.4̲)

9. D (answer: 0.96̲6̲6. . .)

10. A (answer: approximately \$1961 thousand)

11. E (answer: 12.45)

12. C (answer: 12.25)

13. B (answer: 12.3̲)

14. E

15. B

16. C (note: 0.75 is in range C and not B)

17. E (answer: 0.25)

18. B

19. D (note: 0.25 is in range D and not C)

20. A (answer: 0.11̲11. . .)

21. E (answer: 0.88̲88. . .)

22. B (answer: 0.22̲22. . .)