City Semester
Semester Review
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Name:_____

1 Descriptive Statistics

1. Given the data: 1,3,4,4,6,8,12,13,20.
   (a) Give the five numbers summary and a sketch of a box plot that describes this data.
   (b) Give the mean and the standard deviation of the data set.
   (c) What number(s) give a description of the center of the data? How does a skew data set affect these measures?
   (d) What number(s) give a description of the spread of the data? How does a skew data set affect these measures?
2. Draw a symmetric distribution and a skew left distribution the same median. Where are the means of each distribution?
3. What is the purpose of generating a scatterplot?
4. Given a bivariate data set you generate a least squares regression line $\hat{y} = 4x + 3$.
   (a) What y value is predicted for an x value of 10?
   (b) If one of the data points is $(4, 20)$, what is the residual at $x = 4$?
   (c) What is the purpose of looking at the residual plot of a least squares regression line?
5. Is it believable that there is a positive correlation between number hours spent per week playing video games and SAT math scores? Explain.
6. When generating a least squares regression line, what does the r value tell you? what about r^2?

2 Exponentials and Logs

1. When looking at data how can you distinguish linear data from exponential data?
2. If a population of moles is growing at 7% a year give a function expressing the population in terms of t measured in years.
3. Give a sketch of the following functions, clearly marking at least one point, and any asymptotes.
   (a) $f(x) = 2^{-x}$

(b) $g(x) = 5e^x$

(c) $h(x) = -\frac{1}{3}^x$

4. Let $f(x) = 2^x - 4$.

   (a) What is the range of f?

   (b) What is the domain of f?

   (c) Give the equation of the asymptote?

5. The half-life of a drug in blood stream is 10 hours. If you take a 100mg dose at noon, how much is left over in your bloodstream at midnight?

6. Evaluate the following expression without a calculator.

   (a) $\log_2 32$

   (b) $\log 1000$

   (c) $\ln \sqrt{e^2}$

   (d) $\log \frac{1}{100}$

7. Give a sketch of both $f(x) = e^x$ and $g(x) = \ln x$ on the same axes. This illustrates that f and g have what geometric relation to one another?

8. Given $f(x) = \log(x - 2)$

   (a) What is the domain of f?

   (b) What is the range of f?

   (c) Give the equation of any asymptotes.

9. If a population of 200 buffalo is growing by 5% each year, when will the population reach 1200 buffalo?

3 Sequences and Series

Review your test.

4 Combinatorics

1. Simplify the following expressions involving factorials without a calculator.

   (a) $\dfrac{10!}{8!}$

   (b) $2!3!$

   (c) $(2 \cdot 3)!$

   (d) $3! + 4!$

   (e) $(3 + 4)!$

   (f) $\dfrac{n!}{(n+1)!}$

   (g) $\dfrac{n!}{2(n-1)!}$

2. What errors do parts b-e in the previous problem warn against?

3. You select a password consisting of 4 different letters or 4 different digits, how many different passwords are possible?

4. You have 7 books. You want to put 5 of them on the shelf. How many different arrangements can be made?

5. 8 people meet at a party. Each pair of people shakes hands, how many handshakes were there?

6. You have 3 red, 3 blue and 2 yellow flags. You can send messages by placing the 8 flags in sequence. Each different sequence is a different message. How many different messages can you send?