

## Math 1311 Test 2 Review

### Test instructions

**Where:** CASA Testing Center (222 Garrison Gym)

**Time:** 50 minutes

**What is covered?** Chapter 2 and 3

**Number of questions:** 12

10 Multiple Choice Questions 8 points each (total of 80 points)

2 Free Response Questions 10 each (total of 20 points)

For the free response part, please show your work neatly. Do not skip steps.

**Bring your calculator** with you to CASA. If you forget your calculator, you will have to take the test without. There are NO spares. Bring extra batteries too.

**Do not forget to go to CASA for fingerprint/picture process before your test date!**

**Remember the make-up policy: NO MAKE UPS!**

1. Solve for x:

$$5(2x - 7) + 4x = 7 - 2(5 - 3x)$$

$$10x - 35 + 4x = 7 - 10 + 6x$$

$$14x - 35 = -3 + 6x$$

$$8x - 35 = -3$$

$$\frac{8x}{8} = \frac{32}{8}$$

$$x = 4$$

2. Solve for c:

$$ab^2c + 5a^2b = ac + 4a + cb^3$$

$$-ac \quad -ac \quad -cb^3$$

$$-cb^3$$

$$ab^2c - ac - cb^3 + 5a^2b = 4a$$

$$-5a^2b \quad -5a^2b$$

$$ab^2c - ac - cb^3 = 4a - 5a^2b$$

$$\frac{c(ab^2 - a - b^3)}{ab^2 - a - b^3} = \frac{4a - 5a^2b}{ab^2 - a - b^3}$$

$$c = \frac{4a - 5a^2b}{ab^2 - a - b^3}$$

3. A breeding group of foxes is introduced into a protected area, and the population growth follows a logistic pattern. After  $t$  years the population of foxes is given by the following formula:

$$N = \frac{37.5}{0.25 + 0.76^t}$$

- How many foxes were introduced into the protected area?
- Make a graph of  $N$  versus  $t$  and explain in words how the population of foxes increases with time.
- What is the average rate of change in the fox population between the 4<sup>th</sup> and the 9<sup>th</sup> years?
- When will the fox population reach 100 individuals?

a)  $N(0) = \frac{37.5}{.25 + .76^0} = \frac{37.5}{.25 + 1} = 30$  foxes

b) grows rapidly and then levels off.

c)  $AROC = \frac{N(9) - N(4)}{9 - 4} = \frac{112.08 - 64.254}{5} \approx 10$  foxes per year

d)  $\frac{37.5}{.25 + .76^t} = 100$   $\approx 7.58$  years

4. Determine whether the following tables represent linear data. If it does, find a formula for the linear function.

a)

$x$	$2 = x_1$	5	7	8	11
$y$	$5 = y_1$	14	20	23	32

$$\frac{14 - 5}{5 - 2} = \frac{9}{3} = 3$$

$$\frac{20 - 14}{7 - 5} = \frac{6}{2} = 3$$

$$\frac{23 - 20}{8 - 7} = \frac{3}{1} = 3$$

$$\frac{32 - 23}{11 - 8} = \frac{9}{3} = 3$$

Linear  
 $m = 3$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = 3(x - 2)$$

$$4 - 5 = 3x - 6$$

$$y = 3x - 1$$

b)

x	1	2	3	4	5
y	16	64	144	256	400

Not linear

$$\frac{64 - 16}{1} = 48 \quad \frac{144 - 64}{1} \neq 48$$

5. Solve the following systems using the crossing-graphs method.

a)  $3x + 2y = 6$

b)  $x - y = 1$

$4x - 3y = 8$

$3x + 2y = 8$

$$3x + 2y = 6$$

$$2y = -3x + 6$$

$$y = \frac{(-3x + 6)}{2}$$

$Y_1$

$$x = 2, y = 0$$

$$4x - 3y = 8$$

$$-3y = -4x + 8$$

$$y = \frac{(-4x + 8)}{-3}$$

$Y_2$

$$x - y = 1$$

$$-y = -x + 1$$

$$y = \frac{-x + 1}{-1}$$

$$y = x - 1$$

$Y_1$

$$x = 2, y = 1$$

$$3x + 2y = 8$$

$$2y = -3x + 8$$

$$y = \frac{(-3x + 8)}{2}$$

$Y_2$

6. The table below shows enrollment, in millions of people, in private colleges in the United States during the years from 2004 through 2008

Date	Enrollment in millions
2004	4.29
2005	4.47
2006	4.58
2007	4.76
2008	5.13

L1

L2

- a) Plot the data points for college enrollment. Does it look reasonable to approximate these data with a straight line? **YES**
- b) Find the equation of the regression line model for college enrollment as a function of time, and add its graph to the data plot completed in part a).
- c) Explain the meaning of the slope of the line you found in part b).

(b)  $y = .197x + 4.252$

(c) slope = .197  
Enrollment grows by .197 million of students per year

7. Use the crossing-graphs method to solve the given equation. (FREE RESPONSE)

a)  $\frac{20}{1+2^x} = x$

b)  $3^x + x = 2^x + 1$

a)  $\frac{20}{(1+2^x)} = x$   
 $Y_1$   $Y_2$

$x = 2.69$

b)  $3^x + x = 2^x + 1$   
 $Y_1$   $Y_2$

$x = .6$

sketch graphs

8. The base of a ladder is 4 horizontal feet from the wall where its top rests. The slope of the line made by the ladder is 1.7. What is the vertical height of the top of the ladder?  
(Assume that the positive direction points from the base of the ladder toward the wall.)



$$m = \frac{\text{rise}}{\text{run}}$$

$$4 \quad 1.7 = \frac{\text{rise}}{4}$$

$$6.8 = \text{rise}$$

$$\boxed{6.8 \text{ feet}}$$

9. Find the maxima and minima of  $f(x) = x^3 - 10x + 1$  on the horizontal span of -3 to 3.

$$\text{min} = -11.17$$

$$\text{max} = 13.17$$

$x_{\min}$   $x_{\max}$

10. Find the maximum value of  $x^3 + x$  on a horizontal span of 0 to 5.

$$(5)^3 + 5 = \boxed{130}$$

$x_{\min}$   $x_{\max}$

11. It is a fact that the function  $\sqrt{x+1} - \sqrt{x}$  has a limiting value. Find that value.

0 from a table

12. It is a fact that the function  $x(2^{\frac{1}{x}} - 1)$  has a limiting value. Find that value.

. 69 from a table

13. Suppose  $f$  is a linear function such that  $f(2) = 7$  and  $f(5) = 19$ . Write the equation of the function. (FREE RESPONSE)

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{19 - 7}{5 - 2} = \frac{12}{3} = 4$$

$$y - y_1 = m(x - x_1)$$

$$y - 7 = 4(x - 2)$$

$$y - 7 = 4x - 8$$

$$y = 4x - 1$$

14. We have \$56 to spend on pizzas and drinks for a picnic. Pizzas cost \$12 each and drinks cost 50 cents each. Four times as many drinks as pizzas are needed. How many pizzas and how many drinks will our budget allow us to buy? Write a system of equations that describe the situation.

Let  $p = \#$  of pizzas

$d = \#$  of drinks

$$\begin{cases} d = 4p \\ 12p + .5d = 56 \end{cases}$$

$$\text{OR } \begin{cases} d = 4p \\ 1200p + 50p = 5600 \end{cases}$$

