

**Math 10 - Survey of College Mathematics**  
**M. Eastman - Spring 2008**

**FINAL EXAM**

1. Given:  $U = \{ f, u, d, g, e, r, a, t, i, o, n \}$        $A = \{ f, r, i, d, g, e \}$   
 $B = \text{set of letters in the words "fatfood"}$        $V = \{ * | * \text{ is a vowel} \}$   
Find:
- a.  $A'$       b.  $A \cap V$       c.  $A \cup B'$       d.  $(B' \cup V)'$       e.  $(A \cap V') \cup B$
2. Shade the region that represents the set  $(A \cap B') \cup C$
3. In a survey 100 people were asked what they had eaten for breakfast. The following information was obtained:
- |  |                        |
|--|------------------------|
| 30 had eggs ( $E$ )                      | 42 had toast ( $T$ )   |
| 40 had cereal ( $C$ )                    | 17 had eggs and toast  |
| 5 had eggs and cereal                    | 7 had cereal and toast |
| 3 had eggs and cereal, but not any toast |                        |
- a. Fill in the Venn diagram with the results of this survey.  
b. Find the number of people in the survey who had:  
eggs and toast, but not cereal.      exactly one of these foods.      none of these foods.
4. If  $P(A) = .38$ ,  $P(B) = .71$ , and  $P(A \cap B) = .24$ , find:
- a.  $P(A \cup B)$       b.  $P(B')$       c.  $P(A \cap B')$       d.  $P(A | B)$       e.  $P(B | A')$
5. Construct a truth table for the following statement; label intermediate columns, and put the truth value of given statement in the last column (labeled ANSWER).
- $$[p \wedge (r \rightarrow \sim q)] \rightarrow (p \wedge q)$$
6. Make use of DeMorgan's laws to write the given statement in an equivalent form.
- a. It is not the case that I ride my bike or I live in Soquel.  
b. It is not the case that the student went to class and he did not read the book.
7. Translate the argument into symbolic form, and then test its validity. Justify your answer by filling out the truth table for the argument.

The car is red ( $r$ ) or the bus is green ( $g$ ).  
If the bus is not green then the bike is blue( $b$ ).  
 $\therefore$  The car is red or the bike is not blue.



14. A concert promoter knows that he can sell 900 tickets to a venue when the price of a ticket is \$25. Research has shown that for every \$1 increase in price, 20 fewer people will buy a ticket. Let  $x$  be the amount of any increase in price over \$25; for example, when  $x = 3$ , the ticket price would be \$28 and 840 ( $= 900 - 60$ ) people will buy a ticket.
- Write an expression with the variable  $x$  as defined above that represents the price of a ticket.
  - Write an expression with the variable  $x$  as defined above that represents the number of tickets that can be sold at the price given in part a.
  - Write a quadratic expression that represents the total revenue the promoter will receive by selling the number of tickets in b. at the price given in a.
  - Determine the price that the promoter should charge in order to maximize the revenue. State the maximum revenue.
15. An account executive receives a base salary plus a commission. On \$30,000 in monthly sales, an account executive would receive compensation of \$2600. On \$50,000 in monthly sales, the executive would receive compensation of \$3800.
- Determine a linear function that yields the compensation of an account executive for  $x$  dollars in monthly sales.
  - Use the function in a. to determine the compensation of an account executive who has \$75,000 in monthly sales.
16. Find the quadratic function (form  $F(x) = ax^2 + bx + c$ ) for the given data:

$x$	$F(x)$
0	5
1	9
2	7

17. In the following table of function values, one set of function values represents the output of a linear function, another set represents the output of an exponential function, and a third set is neither. Determine which set of values are linear ( $f(x) = mx + b$ ), exponential ( $f(x) = a \cdot b^x$ ) and neither, and find the values of the constants for the linear and exponential functions, correct to two decimal places.

$x$	$G(x)$	$H(x)$	$J(x)$
1	9.1	6.4	6.2
2	7.4	4.8	4.9
3	5.1	3.6	3.6
4	2.2	2.7	2.3

[10 points extra credit: the 'neither' function is a quadratic function. Find this function

$$f(x) = ax^2 + bx + c]$$

1.
  - a.  $\{u, a, t, o, n\}$
  - b.  $\{i, e\}$
  - c.  $\{f, r, i, d, g, e, u, n\}$
  - d.  $\{f, t, d\}$
  - e.  $\{f, r, d, g, a, t, o\}$
2. graph with regions 1, 4, 5, 6, 7
3. a. graph                      b. 15; 60; 15
4. a.  $.38 + .71 - .24 = .85$     b.  $1 - .71 = .29$     c. .14    d.  $\frac{.24}{.71} \approx .338$     e.  $\frac{.47}{.62} \approx .758$

5.

$p$	$q$	$r$	$\sim q$	$r \rightarrow \sim q$	$p \wedge (r \rightarrow \sim q)$	$p \wedge q$	ANSWER
$T$	$T$	$T$	$F$	$F$	$F$	$T$	$T$
$T$	$T$	$F$	$F$	$T$	$T$	$T$	$T$
$T$	$F$	$T$	$T$	$T$	$T$	$F$	$F$
$T$	$F$	$F$	$T$	$T$	$T$	$F$	$F$
$F$	$T$	$T$	$F$	$F$	$F$	$F$	$T$
$F$	$T$	$F$	$F$	$T$	$F$	$F$	$T$
$F$	$F$	$T$	$T$	$T$	$F$	$F$	$T$
$F$	$F$	$F$	$T$	$T$	$F$	$F$	$T$

6.
  - a. I don't ride my bike and I don't live in Soquel.
  - b. The student did not go to class or he read the book.
7. INVALID

Symbolic form:  $r \vee g$   
 $\sim g \rightarrow b$  \_\_\_\_\_  
 $\therefore r \vee (\sim b)$

$r$	$g$	$b$	$r \vee g$	$\sim g$	$\sim g \rightarrow b$	$\sim b$	$r \vee (\sim b)$	ARGUMENT
$T$	$T$	$T$	$T$	$F$	$T$	$F$	$T$	<i>ok</i>
$T$	$T$	$F$	$T$	$F$	$T$	$T$	$T$	<i>ok</i>
$T$	$F$	$T$	$T$	$T$	$T$	$F$	$T$	<i>ok</i>
$T$	$F$	$F$	$T$	$T$	$F$	$T$	$T$	
$F$	$T$	$T$	$T$	$F$	$T$	$F$	$F$	<i>NO</i>
$F$	$T$	$F$	$T$	$F$	$T$	$T$	$T$	<i>ok</i>
$F$	$F$	$T$	$F$	$T$	$T$	$F$	$F$	
$F$	$F$	$F$	$F$	$T$	$F$	$T$	$T$	

