

Math 110 Exam 1  
July 1, 2004

Name \_\_\_\_\_

**Show all of your work. Your answers must be justified.**

**Calculators Permitted.**

1. Express each of the following as a percent:

a.  $\frac{3}{5}$

b. 2.45

2. A coat was originally sold for \$300 and is now being advertised as “20% off” (meaning its price has been reduced by 20%). What is the coat’s current price?

3. If a person’s salary increases from \$36,000 to \$40,320, by what percent has the salary increased?

4. If you borrow \$3000 at a simple interest rate of 4.25%, how much will you owe after 2 years?



9. A young couple decides to buy a house. Their offer of \$200,000 is accepted by the seller. They pay a 25% down payment and get a 30-year mortgage at an annual interest rate of 5.75% for the remaining amount. How much is their monthly payment?

10. For the couple in question 9, complete the portion of their amortization table shown here:

Pmt. #	Unpaid Bal.	Monthly Pmt.	Monthly Int. Rate	Int. Paid	Princ. Paid
1					
2					

11. After each statement write “TRUE” or “FALSE” as appropriate. (Don’t just write “T” or “F”).

- (a) If you are borrowing money at a fixed annual interest rate, it is better for you if the interest is compounded daily than if it is compounded monthly.
- (b) An argument can be valid and have a conclusion that is false.
- (c) The only numeration system still being used today for any purpose is the base ten system.
- (d) The set  $\{2, 4, 6\}$  has 9 different subsets.

12. After each statement write “TRUE” or “FALSE” as appropriate. (Don’t just write “T” or “F”).

- (a)  $7 \in \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$
- (b)  $3 \notin N$
- (c)  $\{a, b, c\} \not\subset \{a, b, c\}$
- (d)  $\emptyset \subset \{3, 5, 7\}$

13. Let  $U = \{a, b, c, d, e, f, g, h\}$ ,  $A = \{e, f, g\}$ ,  $B = \{c, d, e, f\}$ . Find  $(A \cap B) \cup B'$ .

14. Suppose a travel company commissioned a survey that asked 500 people in the Midwest the following three questions and received the indicated answers (all respondents answered either yes or no):

Have you ever been to Disney Land?	Yes: 250
Have you ever been to the Alamo?	Yes: 70
Have you ever been in the St. Louis Arch?	Yes: 150

When publishing the results of this survey, the company notes that 200 of the respondents had not been to any of the three tourist sites. They also noted that 105 people had been to both Disney Land and the St. Louis Arch and 65 people had been to both the Alamo and the St. Louis Arch, and only 50 people had been to all three places.

Use a Venn Diagram to determine how many of the people surveyed had been to two of the tourist sites, but not all three.

15. Let the statements  $p$ ,  $q$ , and  $r$  be defined as follows:

- $p$  : That dog can talk.
- $q$  : That dog is my spokesperson.
- $r$  : That dog does not have a job.

Write the following argument in words.

$$\begin{array}{l} p \rightarrow q \\ \sim q \rightarrow r \\ \sim r \\ \hline \therefore p \end{array}$$

16. Use a truth table to determine if the following argument is valid or invalid.

$$\frac{\begin{array}{c} p \\ q \rightarrow p \end{array}}{\therefore q}$$

17. Write each of the following as a Hindu-Arabic (base ten) numeral.

a. The Babylonian numeral  $\ll \vee \vee \quad < \vee$

b. The Mayan numeral



18. Convert the numeral  $3105_{\text{six}}$  to a numeral in base ten.

19. Convert the base ten numeral 236 to base four.

Simple Interest:  $A = P(1 + rt)$

Compound Interest:  $A = P \left(1 + \frac{r}{n}\right)^{nt}$

Monthly mortgage payment per \$1000 borrowed.

Rate %	Number of Years	
	15	30
5	7.88	5.37
5.25	8.01	5.53
5.5	8.18	5.68
5.75	8.31	5.84
6	8.44	6.00
6.25	8.58	6.16
6.5	8.72	6.33
6.75	8.85	6.49
7	8.99	6.65

Babylonian Numeration System:

$< = 10$ ,  $\vee = 1$ , base 60.

Mayan Numeration System:

$\text{—} = 5$ ,  $\cdot = 1$ ,  $\bigcirc = 0$ , Places: 1's, 20's, 360's, 7200's, etc.