

**EXAM 3**  
Math 105  
December 3, 2009

Name \_\_\_\_\_

You must show all your work. Partial credit will be given.

1. The following table gives the enrollment at public Universities in the state of Washington for the years 1990 to 2000.

Years	
Since 1990	Students
0	81401
1	81882
2	83052
3	84713
4	85523
5	86080
6	87309
7	89365
8	90189
9	91543
10	92821

Find the mathematical model (exponential or logarithm) that best describes this data set. (Write the model on the paper.) Use your model to predict enrollment at public Universities in Washington State for the year 2011. (5 pts)

2. Instructors salaries are \$37000 per year and are expected to increase by 2.5 percent annually. Find a model for the expected value of instructors salaries in  $x$  years. What does your model say instructors salaries will be in 15 years? (8 pts)

3. Solve each of the following exponential equations. (5 pts each)

(a)  $2.7 = 3.1(1.4)^t$

(b)  $3(1.19)^t = 8.31(.51)^t$

4. Reserved seating at a Dave Matthews Band concert at the Gorge Amphitheater in Gorge, Washington, cost \$69.90 in September 2006. If admission fees for concerts are expected to increase by 28 percent per year, what is the expected price of a Dave Matthews Band ticket in September 2010? (5 pts)

5. A new 2002 Jeep Grand Cherokee Laredo has a manufacturer's suggested retail price (MSRP) of \$39,655. A buyer gets an \$8500 credit for her trade-in and finances the balance of the price at her local bank with a 60-month, 5.35% loan. What is her car payment? (6 pts)

6. For each of the following logarithmic formulas rewrite the expression as a single logarithm. (5 pts each)

(a)  $2 \ln(x^3) - 3 \ln(2x^2)$

(b)  $2 \ln(3x) - 4 \ln(x) + 2 \ln(2x^2)$

7. On February 17, 2003, mychashnow.com published the following loan terms:

Loan amount: \$500

Loan term: 7-14 days

finance charge: \$75.24

If the consumer borrows the money for 10 days what is the annual percentage rate on this loan? (8 pts)

8. An investor hope to increase her retirement account to \$1,250,000 by the time she retires 15 years from now. The present value of the account is 219,976.31. She expects her investment to earn an annual rate of 11.38 percent compounded monthly. What must her monthly payments be in order for her to reach her goal? (8 pts)

9. A hotel catering manager is saving up for the down payment on a home. She and her husband currently have \$705.02 in a savings account earning an annual rate of 2.25 percent compounded monthly. She contributes her \$500.00 quarterly bonus to the account each quarter. They anticipate that they will be able to afford a \$175,000 home. How long will it take them to save up enough money to make a down payment that is 10 percent of the price of the home?(8 pts)

10. A three-bedroom, three-bath home on six acres in Rensselaer county, New York, was advertised for \$695,000 in September 2002. A retired executive has been prequalified for a 5.25 percent, 30-year mortgage. She intends to make a 20 percent down payment. The maximum monthly payments she can afford is \$3500. Can she afford this home? (8 pts)

11. The amount of land in U.S. farms may be modeled by  $F(t) = 115.1(0.9352)^t + 900$  million acres where  $t$  is the number of years since 1978. According to this model in what year will the amount of land in U.S. farms drop below 910 million acres? (8 pts)
12. A 3824-square-foot, six-bedroom, three-bath home in Queen Creek, Arizona, was advertised for \$302,691 in February 2005. A family finances 80% of the purchase price with a 5.75% loan. If the family makes \$1500 payments monthly, how long will it take them to pay of the loan? (8 pts)
13. The following table shows the amounts spent on reducing sizes of first-grade through third-grade public school classes in a certain state.

Year	Amount (millions)
1988	1
1990	4
1992	14
1994	37
1996	51
1998	66
2000	69
2001	71

Find a model for this data (exponential or logarithm) and explain *why* you chose that particular model. Use your model to predict the amount spent in 2006. (8 pts)