

Directions: Show all work on this test paper. Each problem is worth 4 point unless stated otherwise
You may then use your calculator on Part 2.

Solve the problem.

- 1) The number of books in a small library increases according to the function $B = 4100e^{0.05t}$, where t is measured in years. How many books will the library have after 6 years? 1) _____

Evaluate the logarithm, if possible. Round the answer to four decimal places.

- 2) a) $\log 0.0525$ b) $\ln 0.997$ 2) a. _____
b. _____

Solve the problem.

- 3) The number of periods needed to double an investment when a lump sum is invested at 11%, compounded semiannually, is given by $n = \frac{\ln 2}{\ln 1.055}$. Find n , rounded to the nearest tenth. 3) _____

- 4) Use the formula $R = \log (I/I_0)$, where the magnitude of an earthquake on the Richter scale is based on I , the measurement of a seismic wave, and I_0 , the measurement of a seismic wave of a level zero earthquake with the same epicenter. An earthquake was recorded which was 25,119 times more powerful than a reference level zero earthquake. What is the magnitude of this earthquake? (Round to the nearest tenth.) 4) _____

Use a change of base formula to evaluate the given logarithm. Approximate to three decimal places.

5) $\log_{4.1}(292)$

5) _____

Solve the equation. If necessary, round to thousandths.

6) $4^{(x-3)} = 22$

6) _____

Solve the inequality.

7) $\left(\frac{1}{2}\right)^x \geq 8$

7) _____

Solve the problem.

8) A sample of 450 grams of radioactive substance decays according to the function $A(t) = 450e^{-.034t}$, where t is the time in years. How much of the substance will be left in the sample after 20 years? Round your answer to the nearest whole gram.

8) _____

- 9) The population of a southern city follows the exponential law. If the population decreased from 900,000 to 800,000 from 1993 to 1995, 9) a. _____
 b. _____
- a) Find the function that models this data,
- b) Use your equation to estimate the population be in 1997?

Solve the problem.

- 10) a) Find natural logarithmic regression equation for the following data. 10) a. _____
 Put your equation in the form $f(x) = a + b \ln x$. b. _____
 b) Use your equation to estimate the production level for the year 1985.
(For the regression equation, assume $t = 0$ is the year 1950.)

Year	Production (in millions)
1960	9.26
1970	51.43
1990	68.91

- 11) Find the amount of money in an account after 5 years if \$4200 is deposited at 4% annual interest compounded quarterly. 11) _____
- 12) Southwest Dry Cleaners believes that it will need new equipment in 6 years. The equipment will cost \$26,000. What lump sum should be invested today at 8% compounded semiannually, to yield \$26,000? 12) _____

13) The natural resources of an island limit the growth of the population. The population of the island is given by the logistic equation

$$P(t) = \frac{4635}{1 + 3.91e^{-0.39t}}$$

where t is the number of years after 1980.

a) Find an interrupt $P(10)$.

b) What is the limiting value of the population?

13) a. _____

b. _____

Answer Key

Testname: M122 EXAM 3 PART 2

- 1) 5534 books
- 2) a. -1.2798 b. -0.0030
- 3) 12.9 periods
- 4) 4.4
- 5) 4.023
- 6) 5.230
- 7) $x \leq -3$
- 8) 228 grams
- 9) a. $y = 9e^{-0.05889t}$ b. about 710,000 people
- 10) a. $y = -116.29 + 55 \ln x$ 79.25 years
- 11) \$5124.80
- 12) \$16,239.52
- 13) a) In 1990 the population was 4295. b) the limiting value is 4635 people