

1. [6 points] Compute the following.

(a) $\log_7 49$

(b) $\log_{49} 7$

(c) $\log_4(0.25)$

(d) $\log 2 + \log 5$

(e) $\ln 1$

(f) $\ln e^e$

2. [6 points] Solve for x .

(a) $\log x^3 = 3$

(b) $\log_5(x^2 + 9) = 2$

(c) $e^{\ln(t+1)} = 3$

3. [8 points] Solve for x .

(a) $\ln(x) + \ln(x + 1) = 0$

(b) $e^{2x} - 4e^x - 21 = 0$

4. [5 points] Graph $y = \log_3 x$. Label the points where $x = \frac{1}{9}, \frac{1}{3}, 1, 3,$ and 9 .
5. [5 points] Graph $y = 1 + 4^{-x}$. Label five points, including the intercept.
6. [10 points] Shade in the portion of the plane where $x + y \geq 3$ and $x - 2y \leq -1$. Find the coordinates of the vertex.
7. [10 points] Find the coordinates of the two points where the graphs of $x^2 + y^2 = 10$ and $y = x^2 + 2$ intersect.

Print Name: _____

Circle Section Time: 10 or 11

Math 1100

Test 3

Part II: Calculators Allowed

8. [12 points] Compute x .

(a) $2^x = 7$

(b) $8e^{2x} = 20$

(c) $4 + 3 \log(2x) = 16$

(d) $\log(3x + 5) = 2$.

9. [3 points] The hydrogen ion concentration of tomato juice is $[\text{H}^+] = 3.2 \times 10^{-4}$ M. What is its pH?
Hint: $\text{pH} = -\log[\text{H}^+]$.

10. [5 points] How long will it take for an investment of \$1000 to double in value if the interest rate is 8.5% per year, compounded continuously?

11. [10 points] The population of a certain city was 112,000 in 1994, and the observed relative growth rate is 14% per year.

(a) Find a function that models the population after t years.

(b) Find the projected population in the year 2000.

12. [10 points] The half-life of cesium-137 is 30 years. Suppose we have a 10 gram sample. Then the model for the amount of cesium after t years is $C(t) = 10e^{-rt}$.

(a) Find the value of r . Hint: a half-life of 30 means $C(30) = \frac{1}{2} \times 10$.

(b) For what value of t will $C(t) = 2$ grams?

13. [10 points] Derive the law of logs that states, $\log_a x^n = n \log_a x$.