Solutions to Selected Problems

Civil Engineering Licensure Exam – Mock Exam (Day 2)

February 25, 2025

Solutions

1. Solve for x in the equation:

$$\log_2(x+1) = 3$$

Solution: Solving Logarithmic Equations

2. If $\log_5 125 = x$, what is the value of x? **Solution:** Logarithmic Equations – Basic Properties

3. Which of the following is equivalent to $e^{\ln 7}$? **Solution:** Exponential and Logarithmic Equations

4. The sum of the first n terms of an arithmetic sequence is given by:

$$S_n = \frac{n}{2}[2a + (n-1)d]$$

What is the sum of the first 10 terms if $a = 2$ and $d = 3$? **Solution:** Arithmetic Sequences Explained

5. The fourth term of a geometric sequence is 81, and the first term is 3. What is the common ratio? **Solution:** Geometric Sequences and Common Ratio

6. Solve for x in the equation:

$$3^{x+1} = 27$$

Solution: Solving Exponential Equations

7. Expand and simplify:

$$\log(a^2b^3) - 2\log b + \log\left(\frac{1}{a}\right)$$

Solution: Logarithmic Expansions and Properties

8. If the population of a city follows the exponential growth model:

$$P(t) = P_0 e^{0.03t}$$

where $P_0 = 5000$ and t is in years, find the population after 5 years. **Solution:** Exponential Growth and Decay

9. Find the sum of the first 15 terms of an arithmetic sequence where $a = 4$ and $d = 6$. **Solution:** Summation of Arithmetic Sequences

10. A ball bounces to 80% of its previous height. If it is dropped from a height of 10 meters, what is the total vertical distance it travels before coming to rest? **Solution:** Geometric Series and Bouncing Ball Problems