Mathematics Questionnaire - Set 2

1. A population of bacteria doubles every 3 hours. If there are initially 200 bacteria, how many will there be after 6 hours?
   a) 400 b) 600 c) 800 d) 1200

2. The half-life of a substance is 10 years. If you start with 80g, how much remains after 20 years?
   a) 20g b) 40g c) 10g d) 5g

3. The equation A = A_0 e^(kt) represents exponential decay when k > 0. (True/False)

4. What is log_2(8)?
   a) 2 b) 3 c) 4 d) 6

5. Which of the following is equal to log(a) + log(b)?
   a) log(ab) b) log(a/b) c) log(a) - log(b) d) log(a^b)

6. The equation log(1) = 0 is always true regardless of the base. (True/False)

7. Solve for x: 2^x = 16.
   a) 2 b) 3 c) 4 d) 5

8. Solve for x: log(x) = 2.
   a) 2 b) 10 c) 100 d) 1000

9. The equation e^x = 5 can be rewritten as x = ln(5). (True/False)

10. A right triangle has a hypotenuse of 10 and an opposite side of 6. What is sin(theta)?
    a) 0.6 b) 0.8 c) 1.2 d) 0.75

11. If tan(theta) = 3/4, what is sin(theta)?
    a) 3/5 b) 4/5 c) 3/4 d) 5/4

12. The hypotenuse of a 30-60-90 triangle is twice the length of the shorter leg. (True/False)

13. Evaluate lim (x -> 2) (x^2 - 4)/(x - 2).
    a) 2 b) 4 c) 3 d) None (undefined)

14. If lim (x -> 0) f(x) = 5, then f(0) must be equal to 5. (True/False)

15. The expression lim (x -> inf) (1/x) evaluates to zero. (True/False)