1. Evaluate the limit \( \lim_{x \to \infty} \frac{3x^2}{8x^2 + 4x} \).
   Correct Answer: \( \frac{3}{8} \)

2. Evaluate the limit \( \lim_{x \to -\infty} (5x - \sqrt{6x^2} - x) \).
   Correct Answer: \( -\infty \)

3. Evaluate the limit \( \lim_{x \to 0} \frac{1 - \cos(x)}{3 \sin^2(x)} \).
   Correct Answer: \( \frac{1}{6} \)

4. Evaluate the limit \( \lim_{x \to 0^+} (e^x + x)^{1/x} \).
   Correct Answer: \( e^2 \)

5. Evaluate the limit \( \lim_{x \to 0^+} \frac{\sin(x^2)}{x \sin(x)} \).
   Correct Answer: \( 1 \)

6. A farmer has 300 feet of fencing and wants to create the largest possible pen from the fence. The pen should also be divided in half by a fence through the middle. Find the length and width which maximize the area of the pen.
   Correct Answer:
   - width = 50 ft, length = 75 ft

7. A line is drawn through the point \((1, 2)\) so that it forms a right triangle with legs along the \(x\)- and \(y\)-axes. Find the slope of the line forming the triangle of least area.
   Correct Answer:
   - \( -2 \)

8. Evaluate the indefinite integral \( \int (x^2 + 6x - \cos(x)) \, dx \).
   Correct Answer:

9. Evaluate the indefinite integral \( \int \frac{1}{\sqrt{x}} \left( 2x^{3/2} - x^{-5/2} \right) \, dx \).
   Correct Answer: \( x^2 + \frac{1}{2x^2} + C \)

10. Evaluate the indefinite integral \( \int (1 + x^3)^2 x^2 \, dx \).
    Correct Answer: \( \frac{(x^3 + 1)^3}{9} + C \)

11. Evaluate the indefinite integral \( \int \frac{\sin(x)}{(1 + \cos(x))^7} \, dx \).
    Correct Answer: \( \frac{1}{6(1 + \cos(x))^6} + C \)

12. Evaluate the indefinite integral \( \int \frac{x}{1 + x^4} \, dx \).
    Correct Answer: \( \frac{1}{4} \tan^{-1}(x^2) \)

13. Evaluate the definite integral \( \int_5^{11} \frac{1}{1 + x} \, dx \).
    Correct Answer: \( \ln 2 \)

14. Evaluate the definite integral \( \int_1^2 \frac{e^{1/x}}{x^2} \, dx \).
    Correct Answer: \( e - e^{1/2} \)

15. Given \( F(x) = \int_{2x}^{x^2} \cos^3(t) \, dt \) find \( F'(x) \).
    Correct Answer: \( 2x \cos^3(x^2) - 2x^3 \cos^3(x) \)

16. Find the average value of \( f(x) = \sec^2(x) \) on \([0, \pi/4]\).
    Correct Answer: \( \frac{4}{\pi} \)

17. Given \( g(x) = \frac{1}{x^2} \) on \([-2, -1]\) find \( c \) so that \( \int_a^b g(x) \, dx = g(c)(b - a) \) (MVT for integrals).
    Correct Answer: \( -\sqrt{2} \)

18. Solve the initial value problem \( \frac{dy}{dx} = \frac{x}{\sqrt{9 + x^2}} \) with \( y(4) = 5 \).
    Correct Answer: \( y = \sqrt{9 + x^2} \)