Assignment 4

1. Given the function $f(x) = x^3 - 2x + 1$, find $f(-2)$.

2. Find the derivative of $g(x) = e^{2x}$ with respect to $x$.

3. Evaluate the integral $\int x^2 dx$.

4. Sketch the graph of $y = \sin(x)$ for $0 \leq x \leq 2\pi$.

5. Solve the differential equation $\frac{dy}{dx} = 2x$ with the initial condition $y(0) = 1$.

6. Find the limit $\lim_{x \to 0} \frac{\sin(x)}{x}$.

7. Use the binomial theorem to expand $(x + y)^4$.

8. Find the area under the curve $y = x^2$ from $x = 0$ to $x = 2$.

9. Simplify the expression $\sqrt{16x^2}$.

10. If $a > 0$ and $b > 0$, which of the following is true?
   - $a + b > a * b$
   - $a + b < a * b$
   - $a + b = a * b$
   - Cannot be determined

11. Find the equation of the line passing through the points $(1, 2)$ and $(3, 4)$.

12. Use the method of partial fractions to integrate $\frac{1}{x^2(x+1)}$.

13. Find the roots of the quadratic equation $x^2 - 5x + 6 = 0$.

14. Solve the system of equations $2x + 3y = 7$ and $x - y = 2$.

15. Find the derivative of $f(x) = \ln(x^2)$.

16. Evaluate the definite integral $\int_0^1 x^2 dx$.

17. Find the inverse of the function $f(x) = 2x + 1$.

18. Use the Taylor series to approximate $\sin(0.1)$.

19. Find the volume of the solid obtained by revolving the curve $y = x^2$ about the x-axis from $x = 0$ to $x = 1$.

20. Use the method of numerical integration (e.g., trapezoidal rule) to approximate $\int_0^1 x^3 dx$ with $n = 4$.

21. Find the maximum value of the function $f(x) = -x^2 + 4x - 3$ on the interval $[0, 4]$.