Assignment 2

1. Differentiate the function $f(x) = x^2 - 3x + 2$.

2. Evaluate the indefinite integral of $f(x) = 3x^2 - 2x + 1$.

3. Determine the area under the curve $y = x^3 - 2x + 1$ from $x = 0$ to $x = 2$.

4. Solve the differential equation $\frac{dy}{dx} = 2x - 3$ with initial condition $y(0) = 4$.

5. Find the limits of $\lim_{x \to 0} \frac{\sin(x)}{x}$ and $\lim_{x \to \infty} e^{-x}$. Are these limits finite or infinite?

6. Use the Taylor series expansion of $e^x$ at $x = 0$ to find an approximation of $e^{0.1}$.

7. Use the Binomial theorem to expand $(x + y)^5$.

8. Evaluate the definite integral of $\int_0^1 (2x^2 + 3x + 1) \, dx$ and interpret its meaning.

9. Calculate the derivative of the function $f(x) = \sin(x) + \cos(x)$.

10. Determine the coordinates of the points where the line $y = 2x + 3$ intersects the parabola $y = x^2 - 4x + 5$.

11. Sketch the graph of the function $f(x) = \frac{1}{x}$ and label key features such as intercepts, asymptotes, and critical points.

12. Solve the system of equations:

   \begin{align*}
   2x + 3y &= 7 \\
   4x - 5y &= 1 \\
   
   \end{align*}

13. Evaluate the limit $\lim_{x \to \infty} \frac{\ln(x)}{x}$.

14. Find the Taylor series expansion of $\ln(1 + x)$ at $x = 0$ and use it to approximate $\ln(1.2)$.

15. Use the Taylor series expansion of $\sin(x)$ at $x = 0$ to approximate $\sin(0.1)$.

16. Calculate the area enclosed by the curve $y = \sqrt{x}$ from $x = 1$ to $x = 4$.

17. Evaluate the integral $\int_0^\pi \sin(x) \cos(x) \, dx$.

18. Find the Taylor series expansion of $\tan(x)$ around $x = 0$ and use it to approximate $\tan(0.1)$.

19. Find the asymptotes of the function $f(x) = \frac{1}{x^2 - 4}$.

20. Calculate the derivative of the function $f(x) = \frac{1}{x^2}$ at $x = 1$ and $x = -1$.

The result of the function $f(x) = \sin(x) + \cos(x)$ is a periodic function with a period of $2\pi$. This function is defined for all values of $x$ and its value oscillates between -1 and 1, with a maximum of 0 at $x = \frac{\pi}{2}$ and $x = \frac{5\pi}{2}$, and a minimum of 0 at $x = \frac{\pi}{2}$ and $x = \frac{3\pi}{2}$.