1. \[ \int \frac{6x + 8}{3x^2 + 8x + 5} \, dx = \]

2. Given \( f(x) = 4x^2 + 11x - 3 \), find \( (f^{-1})'(12) \).

3. \[ \int (\cos x)^3 \, dx = \]

4. \[ \int \frac{1}{x^2 + 2x + 10} \, dx = \]

5. \[ \int x^2 e^x \, dx = \]

6. \[ \int \frac{3x - 13}{x^2 + 3x - 10} \, dx = \]

7. \[ \lim_{x \to 0} \frac{2x - \sin x}{x} = \]

8. \[ \lim_{x \to \pi/2} (\tan x - \sec x) = \]

9. \[ \int_1^{\infty} 2xe^{2x} \, dx = \]

10. \[ \int_0^3 \frac{dx}{(x - 1)^{2/3}} = \]

11. Determine if the following series converges:
    \[ \sum_{k=1}^{\infty} \frac{1}{1 + k^2}. \]

12. Determine if the following series is absolutely convergent, conditionally convergent or divergent:
    \[ \sum_{n=1}^{\infty} (-1)^{n+1} \frac{n}{10n + 1}. \]
13. Find the convergence set for the power series

\[ 1 + \frac{(x+1)}{2} + \frac{(x+1)^2}{2^2} + \frac{(x+1)^3}{2^3} + \ldots \]

14. Find the power series centered at 0 for \( f(x) = \frac{x}{1/x + 3x} \) and determine its convergence set.

15. Find the Taylor series in \((x - 2)\) of the function

\[ f(x) = 1 - x + x^4. \]

16. Find the general solution of the differential equation \( y'' + y' - 6y = 2x^2 \). Find a particular solution satisfying \( y(0) = 2 \) and \( y'(0) = -1 \).

17. Review the problems from exam III.