

3. Find $f'(x)$ if $f(x) = e^{x^2} \left(\int_0^x e^{-t^2} dt \right)$. Hint: Use the product rule and the Fundamental Theorem of Calculus. Note: Any attempt to evaluate the integral is futile!

4. Find the value of the determinant $\begin{vmatrix} 0 & 1 & -2 & 3 \\ 2 & -1 & 2 & 3 \\ 0 & -3 & 4 & 5 \\ 0 & 2 & 3 & 4 \end{vmatrix}$.

5. Evaluate $\int x \sqrt{x+1} dx$ Hint: Use u -substitution.

6. Evaluate $\int t e^{-3t} dt$ Hint: Use integration by parts.
7. Evaluate $\int e^x \cos x dx$ Hint: Let $I = \int e^x \cos x dx$ and use integration by parts twice and solve for I .
8. Evaluate $\int \frac{3}{x(x^2 + 1)} dx$ Hint: Use partial fractions.

9. Find the Taylor series expansion of $f(x) = \ln x$ at $x_0 = 1$, in closed form. Hint: $\sum_{n=0}^{\infty} \frac{f^{(n)}(x_0)}{n!} (x-x_0)^n$.
10. Find the radius of convergence and interval of convergence of $\sum_{n=0}^{\infty} \frac{2^{-n}}{n+1} (x-1)^n$. Hint: Apply the ratio test and check for convergence at the endpoints.