

1. (10%) Find the inverse matrix of A , where $A = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1/2 & 1 \\ 1/3 & 0 & 0 \end{bmatrix}$.
2. (15%) Solve the initial value problem of $2xydx + (1 + x^2)dy = 0$, $y(2) = 5$.
3. (15%) Find a complete solution of the equation $x^2y'' - 4xy' + 6y = 2x^4$.
4. (15%) Let $F(s) = \frac{6s}{(s^2 + 9)^2}$ be the Laplace transform of $f(t)$. Find $f(t) = ?$
5. (15%) Find the half-range cosine expansion of the function $f(t) = t^2$, $0 \leq t < 1$.
6. (15%) Find the line integral $\int_C (zdx + xdy + ydz)$, where C is the triangle with vertices $(3, 0, 0)$, $(0, 0, 2)$ and $(0, 6, 0)$, traversed in the given order.
7. (15%) For a complex function $f(z) = \frac{-3z + 4}{z(z-1)(z-2)}$, find $\oint_C f(z)dz = ?$
where $C: |z| = \frac{3}{2}$.