

Applied Mathematics India

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- (c) Show that $\vec{F} = (y e^{xy} \cos z) \mathbf{i} + (x e^{xy} \cos z) \mathbf{j} - (e^{xy} \sin z) \mathbf{k}$ is irrotational and 8
find the scalar potential for \vec{F} and evaluate $\int_c \vec{F} \cdot d\mathbf{r}$ along the curve joining
the points $(0, 0, 0)$ and $(-1, 2, \pi)$.
4. (a) Evaluate by Green's theorem. $\int e^{-x} \sin y dx + e^{-x} \cos y dy$ where c is the rectangle 6
whose vertices are $(0, 0)$, $(\pi, 0)$, $(\pi, \frac{\pi}{2})$ and $(0, \frac{\pi}{2})$.
- (b) Find the half range sine series for the function. 6
$$f(x) = \frac{2kx}{\ell}, \quad 0 \leq x \leq \frac{\ell}{2}$$
$$= \frac{2k}{\ell}(\ell - x), \quad \frac{\ell}{2} \leq x \leq \ell$$
- (c) Find the inverse z-transform of $\frac{1}{(z-3)(z-2)}$ 8
(i) $|z| < 2$
(ii) $2 < |z| < 3$
(iii) $|z| > 3$.
5. (a) Solve using Laplace transform. $\frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 3y = e^{-x}$, $y(0) = 1$, $y'(0) = 1$. 6
- (b) Express $f(x) = \frac{\pi}{2} e^{-x} \cos x$ for $x > 0$ as Fourier sine integral and show that 6
$$\int_0^{\infty} \frac{w^3 \sin wx}{w^4 + 4} dw = \frac{\pi}{2} e^{-x} \cos x.$$
- (c) Evaluate $\iiint_s \vec{F} \cdot \mathbf{n} ds$, where $\vec{F} = x\mathbf{i} - y\mathbf{j} + (z^2 - 1)\mathbf{k}$ and s is the cylinder formed 8
by the surface $z = 0$, $z = 1$, $x^2 + y^2 = 4$, using the Gauss - Divergence theorem.

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Indian Mathematics Wikipedia

Indian mathematics emerged in the Indian subcontinent from 1200 BC until the end of the 18th century. In the classical period of Indian mathematics (400 AD to 1200 AD), important contributions were made by scholars like Aryabhata, Brahmagupta, and Bhaskara II. The decimal number system in use today was first recorded in Indian mathematics. Indian mathematicians made early contributions to the ...