Answer

Read carefully and give the answer in its most simplified form in the space provided.
1 point for each blank space)

1. Evaluate Laplace transform $F(S)$:

   a) $l\{u(t-\pi)\sin(t-\pi)\} = \underline{\dfrac{e^{-\pi S}}{S^2+1}}$

   b) $l\{\int_0^t e^{3(t-\tau)}\tau d\tau\} = \underline{\dfrac{1}{S^2(S-3)}}$

2. Evaluate inverse Laplace transformation $f(t)$:

   a) $l^{-1}\left\{\dfrac{S+2}{s^2+4s+3}\right\} = \underline{e^{-2t}\cosh t}$ or $\dfrac{e^{-t}+e^{-3t}}{2}$

   b) $l^{-1}\left\{e^{-2s}\dfrac{1}{s^2}\right\} = \underline{(t-2)u(t-2)}$

3. Give the parametric representation of the curve along the line segment from $(1,-1,0)$ to $(2,1,-1)$

   Ans. $r(t) = \underline{(1+t, -1+2t, -t)}, \quad 0 \le t \le 1$

4. Find the length of the curve parameterized by $r(t) = (3\cos t, 3\sin t, 4\,t)$ over $0 \le t \le \pi$.

   Ans. $= \underline{5\pi}$

5. Given vector field $F(x,y,z) = xyi + yzj + xzk$, then find

   a) $div F = \underline{y + z + x}$

   b) $curl F = \underline{-yi - zj - xk}$

6. Find the work done by force $F(x,y,z) = -yi + xj + z^3k$ on an object moving along the curve $c: r(t) = \cos ti + \sin tj + 2tk$ for $0 \le t \le 1$.

   Ans. $= \underline{5}$

7. Evaluate the line integral $\int_C (1+xy)ds$, where the curve C is along the circle $x^2 + y^2 = 16$

   Ans. $= \underline{8\pi}$