REVIEW EXERCISES

(1) Evaluate $\mathcal{L}[5\cos \pi t]$

(2) Evaluate $\mathcal{L}[f(t)]$ where $f(t) = \begin{cases} 1 & 0 < t < 2 \\ 0 & t \geq 2 \end{cases}$

(3) Evaluate $\mathcal{L}^{-1}\left[\frac{10}{s^2 - 25}\right]$

(4) Evaluate $\mathcal{L}^{-1}[e^{3t} t^2]$, $\mathcal{L}^{-1}[e^{-3t} \cos 5t]$

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(1) Compute $\nabla f(x,y)$, $D_u f(x,y)$

for $f(x,y) = 5y^2 + x^2 y$, $u = \left(\frac{1}{\sqrt{5}}, \frac{2}{\sqrt{5}}\right)$

(2) If $F = (x^3y^2 + z^4)\,i + 4x^2y^3z\,j + y^2z^3\,k$

find curl F and div F.

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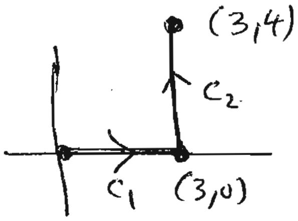
(3) Evaluate $\oint_C y\,dx + x\,dy$ on the curve C



(4) Write statements equivalent to the following statement

" $\int_C P\,dx + Q\,dy$ is independent of the path C "

(5) Use Green's Theorem or Stokes' Theorem or Divergence Theorem to evaluate:

(a) $\oint_C (x^2y)\,dx + \left(\frac{1}{3}x^3 + x\right) dy$ where C is the unit circle

(b) $\oint_C z\,dx - x\,dy + y\,dz$, where C is the trace of the cylinder $x^2+y^2=1$ in the plane $z=4$.

(c) $\iint_S (F \cdot n)\,dS$ where $F = x\,i + 2y\,j + z^2\,k$; D the region bounded by the sphere $x^2+y^2+z^2=4$.

(1) Expand in a Fourier Series $f(x) = \begin{cases} 0 & -\pi < x < 0 \\ -x & 0 \le x < \pi \end{cases}$

(2) Expand in a Cosine Series $f(x) = 1$, $-1 < x < 1$

(3) what is Gibbs phenomenon.

(4) Classify the following equations

(a) $\Delta u + u^2 = 0$ ~~(b) $u \cdot \nabla u =$~~ 0

(b) $3\dfrac{\partial^2 u}{\partial y^2} = \dfrac{\partial u}{\partial x}$ (c) $5\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$

(d) $2\dfrac{\partial^2 u}{\partial x^2} - \dfrac{\partial^2 u}{\partial t^2} + u = 0$