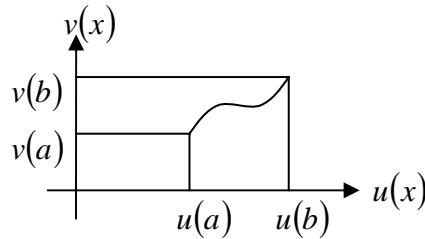# 海洋大學河海工程研究所 BEM PDE 基本能力測試參考解答 2006

1. Partial integration

$$\int u\,dv = uv - \int v\,du$$

2. Gauss theorem

$$\iint_S \vec{F} \cdot \vec{n}\,dS = \iiint_V \nabla \cdot \vec{F}\,dV$$

3. Stokes' theorem

$$\oint_C \vec{F} \cdot d\vec{r} = \iint_S \left(\nabla \times \vec{F}\right) \cdot \vec{n}\,dS$$

4. Green's function

在 s 處施加一外力項，而在 x 處所得之反應 $G(x,s)$

5. Green's theorem

$$\oint_C f(x,y)\,dx + g(x,y)\,dy = \iint_D \left(\frac{\partial g}{\partial x} - \frac{\partial f}{\partial y}\right)dx\,dy$$
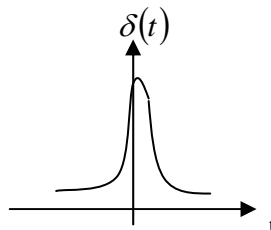
6. Divergence and curl

$$div\left(\vec{F}\right) = \nabla \cdot \vec{F} = \frac{\partial F_1}{\partial x_1} + \frac{\partial F_2}{\partial x_2} + \frac{\partial F_3}{\partial x_3}$$

$$curl\left(\vec{F}\right) = \nabla \times \vec{F} = \begin{vmatrix} i & j & k \\ \frac{\partial}{\partial x_1} & \frac{\partial}{\partial x_2} & \frac{\partial}{\partial x_3} \\ F_1 & F_2 & F_3 \end{vmatrix}$$

7. Dirac-Delta function

$$\int_{-\infty}^{\infty} \delta(t)\,dt = 1, \quad \delta(t) = \begin{cases} \infty, t = 0 \\ 0, t \neq 0 \end{cases}$$
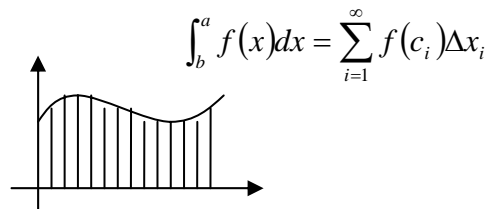

8. Directional derivative

$$\frac{\partial u}{\partial n} = \nabla u \cdot \vec{n}$$

9. Riemann sum

$$\sum_{i=1}^{n} f(c_i)\Delta x_i, \quad x_{i-1} \leq c_i \leq x_i$$

$$\int_b^a f(x)\,dx = \sum_{i=1}^{\infty} f(c_i)\Delta x_i$$

10. Cauchy principal value

$$\int_{-1}^{1} \frac{1}{x}\,dx = \lim_{\varepsilon \to 0} \int_{-1}^{-\varepsilon} + \int_{\varepsilon}^{1} \frac{1}{x}\,dx$$

以前沒學好 沒關係　From now on, you can do something. Good luck