《一百一十四學年度第二學期微積分會考答案卷》(A 卷)

第一部份：單選擇題

1	**B**	**2**	**A**	**3**	**D**	**4**	**A**	**5**	**A**
6	**D**	**7**	**C**	**8**	**B**	**9**	**C**	**10**	**D**

第二部份：複選擇題

11	**ABC**	**12**	**BC**	**13**	**ABD**	**14**	**AC**	**15**	**AB**

《一百一十四學年度第二學期微積分會考答案卷》(B 卷)

第一部份：單選擇題

1	**A**	**2**	**B**	**3**	**A**	**4**	**D**	**5**	**D**
6	**A**	**7**	**B**	**8**	**C**	**9**	**C**	**10**	**D**

第二部份：複選擇題

11	**BC**	**12**	**ABC**	**13**	**AC**	**14**	**ABD**	**15**	**AB**

第三部份：填充題 (A、B 卷相同)

1		
(a)	**(b)**	**(c)**
$\frac{(-1)^n}{n+1}$	$(-1, 1]$	$\pi^2/12$

三、計算證明題

2. Let S be the surface whose equation in spherical coordinates is given by

$$\rho = 1 - \cos\phi,$$

where ϕ is measured from the positive z-axis. Let E be the solid enclosed by S and D be the cross-section of E by the vertical half-plane $\theta = \pi/3$.

(a) (5 points) Find the volume of E.

(b) (5 points) Find the area of D.

Solution: For (a), the volume of E equals

$$\begin{aligned} V(E) &= \int_0^{2\pi}\int_0^{\pi}\int_0^{1-\cos\phi} \rho^2 \sin\phi d\rho\phi d\theta \\ &= \frac{2\pi}{3}\int_0^{\pi}(1-\cos\phi)^3\sin\phi d\phi \\ &= \frac{8\pi}{3} \end{aligned}$$

For (b),

$$\begin{aligned} A(D) &= \int_0^{\pi}\int_0^{1-\cos\phi} \rho d\rho d\phi \\ &= \frac{1}{2}\int_0^{\pi}(1-\cos\phi)^2 d\phi \\ &= \frac{3\pi}{4} \end{aligned}$$