Calculus

2013/12/02

考試注意事項：

1. 答案紙直行對折，兩直欄書寫作答。
2. 無清楚計算過程，不予計分。

試題：

1. (15%) Find dy/dx if

$$\int_0^x \sqrt{3+2\cos t}\,dt + \int_0^y \sin t\,dt = 0$$

2. (15%) Find the area of the surface obtained by revolving the given curve about the indicated axis:

$$x = \frac{1}{6}y^3 + \frac{1}{2y}, \quad \text{for} 1 \le y \le 2; \quad \text{the } y\text{-axis}$$

3. (15%) Find $\int x \sec x^2 dx$.

4. (15%) If $f(x) = \int_2^x \frac{dt}{\sqrt{1+t^3}}$, where $x > -1$, what is $(f^{-1})'(0)$?

5. (10%) Evaluate $\int_0^{\pi/4} \cos^3 2x \sin 2x\,dx$.

6. (10%) Evaluate the limit by interpreting it as the limit of a Riemann sum of a function on the interval $[a, b]$:

$$\lim_{n\to\infty} \frac{\pi}{2n} \sum_{k=1}^{n} \cos\left(\frac{k\pi}{2n}\right); \quad [0, \frac{\pi}{2}]$$

7. (5%,5%) Use both the method of disks and the method of cylindrical shells to find the volume of the solid generated by revolving the region bounded by the graphs of the equations about the indicated axis:

$$y = \sqrt{1-x^2}, \quad y = -x+1; \quad \text{the } x\text{-axis}$$

8. (10%) Evaluate $\int_1^e \frac{\ln x}{x} e^{(\ln x)^2} dx$