國立雲林科技大學
101 學年度碩士班暨碩士在職專班招生考試試題

系所：環安系
科目：微積分(1)

1. 試求解函數 $f(x)=\dfrac{2x^2}{x^2-1}$ 的下列問題? (25%)
   (A) 定義域及值域
   (B) 截距及對稱性
   (C) 漸近線
   (D) 極值及反曲點
   (E) 繪出圖形

2. 試繪出下列方程式所圍成之區域，並求出其面積? (10%)

$$y=\sqrt{x}\ ,\ y=-x+6\ ,\ y=1$$

3. 試求解下列積分式? (15%)
   (A) $\int(x^2-3x-1)\cos x\,dx$
   (B) $\int\cos^7 x\,dx$
   (C) $\int\dfrac{2^{\ln x}}{x}dx$

4. You have been asked to design a one-liter can shaped like a right circular cylinder (Figure 1). What dimensions will use the least material? (15%)

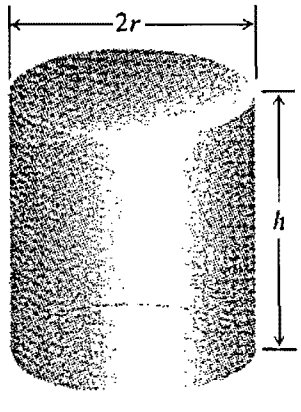

Figure 1

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5. The triangular plate shown in Figure 2 has a constant density of $\delta = 3$ g/cm^2. Find (a) the plate's moment M_y about the y-axis. (b) the plate's mass M. (c) the x-coordinate of the plate's center of mass. (15%)

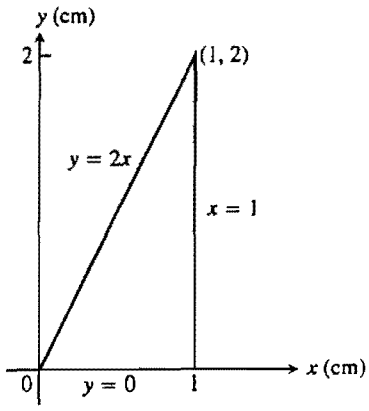

Figure 2

6. Water is flowing at the rate of 2m^3/min into a tank in the form of an inverted cone (Figure 3) having an altitude of 16 m and a radius of 4 m. How fast is the water level rising when the water is 5 m deep? ($V = (1/3)\pi r^2 h$) (20%)

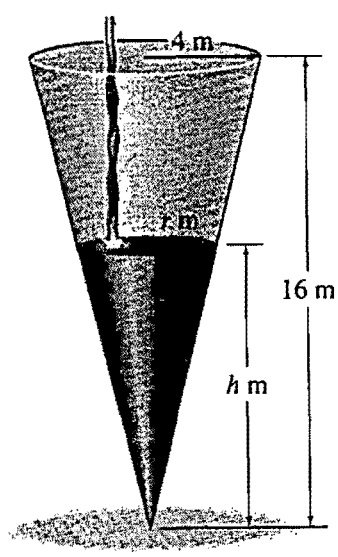

Figure 3