

國立高雄師範大學 112 學年度學士班轉學生招生考試試題

系所別：電機工程學系 二年級

科目：微積分（全一頁）

- ※注意：1.不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上，於本試題上作答者，不予計分。
2.限用藍色或黑色筆作答，以其他顏色作答者不予計分。

◆計算題（需詳列計算過程）每大題 10 分

1. Figure 1 shows the region in the first quadrant bounded by the curves $y = x^2$ and $y = 2x$. A solid is formed by rotating the region about the line $x = -1$. Find the volume of the solid using (a) x as the variable of integration (5%) and (b) y as the variable of integration. (5%)

2. Find the area of the surface obtained by rotating the circle $x^2 + y^2 = r^2$ about the line $y = r$. (10%)

3. Find the points on the cone $z^2 = x^2 + y^2$ that are closest to the point $(4, 2, 0)$. (10%)

4. Differentiate $y = \frac{(x^{3/4})\sqrt{x^2+1}}{(3x+2)^5}$. (10%)

5. Evaluate $\lim_{x \rightarrow \infty} \left[x - x^2 \ln \left(\frac{1+x}{x} \right) \right]$. (10%)

6. Find $\frac{d}{dx} \ln \frac{x+1}{\sqrt{x-2}}$. (10%)

7. Evaluate $\lim_{h \rightarrow 0} \frac{(3+h)^2 - 9}{h}$. (10%)

8. If $f(x, y) = \sin \left(\frac{x}{1+y} \right)$, calculate $\frac{\partial f}{\partial x}$ (5%) and $\frac{\partial f}{\partial y}$ (5%).

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

10. Find the gradient of $f(x, y)$ where $f(x, y) = \sin(x) + e^{xy}$. (10%)

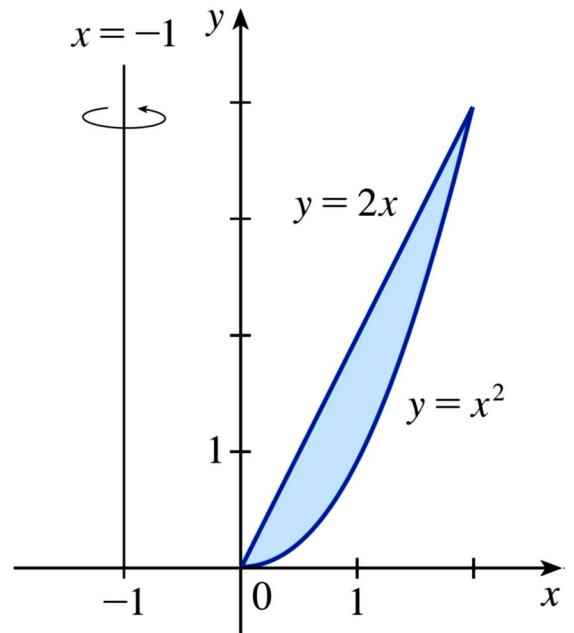


Figure 1.