

考試科目	微積分	所別	智慧財產研究所 4201	考試時間	2月26日(日)第一節
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1. (20分) Find area between $x = y^2$ and $2y = x - 3$.
2. (30分) Let m, n be positive integers and $\log(\cdot)$ denotes the natural logarithm, compute

(a)

$$\lim_{\theta \rightarrow 0} \frac{\sin(n\theta)}{\sin(m\theta)}$$

(b)

$$\lim_{\theta \rightarrow 0} \frac{\log(1 + 5\theta)}{\theta}$$

(c)

$$\lim_{x \rightarrow \infty} x^{100} \cdot 2^{-0.01x}$$

3. (20分) Compute

(a)

$$\int_1^{\infty} \frac{1}{\sqrt{x}} dx$$

(b)

$$\int_1^{\infty} \frac{1}{x\sqrt{x}} dx$$

4. (30分) Let

$$f(t) = \frac{1}{\sqrt{2\pi}} \exp(-t^2/2)$$

and θ a real number. Compute

(a)

$$A = \int_0^{\infty} f(t) dt$$

(b)

$$g(\theta) = \int_{-\infty}^{\infty} \exp(\theta t) f(t) dt$$

(c)

$$\frac{d^2}{d\theta^2} g(\theta) |_{\theta=0}$$