

科目：微積分 適用：財金所

編號：354

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本試題
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第 1 頁

1. State and explain the following terminologies. (10%)

(i). The fundamental theorem of calculus.

(ii). The mean value theorem.

2. Calculation. (48%)

(i) Evaluate $\int_0^{\infty} e^{-t^2/2} dt$. (ii) Evaluate $\int_0^8 \frac{dx}{(x-4)^3}$.(iii) Find $\int x\sqrt{x^2-9} dx$. (iv) Find $\int \frac{1}{x\sqrt{x+1}} dx$.(v) Evaluate $\int_0^2 \frac{x}{1+e^{-x^2}} dx$.(vi) Find $\lim_{x \rightarrow 0} \frac{\sin [\tan (\sin 7x)]}{x}$.

3. Describe the interval(s) on which the function is continuous.

(i). $f(x) = \frac{[x]}{2} + x$, where $[x]$ = greatest integer less than or equal to x .

(7%)

(ii). $h(x) = f(g(x))$, $f(x) = \frac{1}{\sqrt{x}}$, $g(x) = x-1$, $x > 1$. (5%)

4. Sketch the graph of the function. Label the intercepts, relative extrema, points of inflection, and asymptotes. Then state the domain of the function. (20%)

(i). $f(x) = \frac{2x^2}{x^2-1}$.(ii). $f(x) = \frac{x^2}{\sqrt{x+1}}$.5. The region \mathcal{R} enclosed by the curves $y=x$ and $y=x^2$. (10%)(i). Find the volume of the solid obtained by rotating the region \mathcal{R} about the x -axis.(ii). Find the volume of the solid obtained by rotating the region \mathcal{R} about the line $y=2$.