

- 注意：請於試卷上『非選擇題作答區』標明題號作答。
- 禁止使用計算機或類似功能電子器具。

● PART I. Fill in the blanks. Each blank is worth 7 points. Only the final clearly labeled answer will be graded.

1. Evaluate

$$\lim_{x \rightarrow 0} \left( \frac{\sqrt{x+4} - 2}{\tan^{-1}(\pi x)} \right) = \underline{\hspace{2cm}} \quad (1)$$

2. The curve described by  $x - \sqrt{xy} + y = 3$  passes through the point  $(4, 1)$ . Find an equation for the tangent line to the curve at  $(4, 1)$ .  $\underline{\hspace{2cm}}$  (2)

3. The absolute maximum value of the function  $f(x) = x^6 e^{-2x^2}$  is  $\underline{\hspace{2cm}}$  (3)

4. The graph of the function  $g(x) = \frac{\ln(x^3)}{\sqrt{x}}$  has an inflection point at  $x = \underline{\hspace{2cm}}$  (4)

5. Solve for the function  $f$  that satisfies

$$\int_{\sqrt{x}}^4 \frac{f(t^2)}{\ln t} dt = e^{(x-16)^2} - \frac{x}{16}, \quad x > 1.$$

$$f(x) = \underline{\hspace{2cm}} \quad (5)$$

6. The volume generated by rotating the region under the curve  $y = \frac{1}{\sqrt{x}(\sqrt{x}+1)}$  from  $x = 1$  to  $x = 4$  about the  $x$ -axis is  $\underline{\hspace{2cm}}$  (6)

見背面

