國立彰化師範大學107學年度碩士班招生考試試題

系所： __企業管理學系__   組別： __選考丁__   科目： __微積分__

☆☆請在答案紙上作答☆☆

一、選擇題

1. Find $\lim\limits_{x \to 4^+} \{ \dfrac{x-4}{\sqrt{x^2-16}} \} = ?$ (5%)

   (A) $\dfrac{\infty}{\infty}$.　　　　(B) 0.　　　　(C) ∞.　　　　(D) 4.

2. Find $\lim\limits_{\theta \to \pi/2} \dfrac{\ln[\sin(\theta)]^3}{\pi/2 - \theta}$ (Apply l'Hôpit al's Rule). Here, ln is the nature logarithm. (5%)

   (A) $\dfrac{0}{0}$.　　　　(B) ∞.　　　　(C) 1.　　　　(D) 0.

3. Let function $f(y) = y(y^2+9)^{-1}$, y is the variable. Please try to select which one in the following is the critical points and local maximum or local minimum? (5%)
   (A) Critical points: -3, 3; 3 is the local maximum ; -3 is the local minimum.
   (B) Critical points: -3, 3; - 3 is the local maximum ; 3 is the local minimum.
   (C) No critical points; no local minima or maxima.
   (D) Critical points: -3, 0, 3; local maximum is 3; local minimum -3.

4. Assume θ is a function of r, and $r^4 + \sin(\theta) = \theta^2 r^3$, how about $\dfrac{d\theta}{dr} = ?$ (5%)

   (A) $\dfrac{d\theta}{dr} = \dfrac{3\theta^2 r^2 - 4r^3}{2\cos(\theta) - r^3\theta}$.　　　　(B) $\dfrac{d\theta}{dr} = \dfrac{4\theta^2 r^2 - 3r^3}{\cos(\theta) - 2r^3\theta}$.

   (C) $\dfrac{d\theta}{dr} = \dfrac{4\theta^2 r^2 - 3r^3}{2\cos(\theta) - r^3\theta}$.　　　　(D) $\dfrac{d\theta}{dr} = \dfrac{3\theta^2 r^2 - 4r^3}{\cos(\theta) - 2r^3\theta}$.

5. Find the result of the indefinite integral: $w = \int y * \sin(2y^2) * dy = ?$ (5%)

   (A) $-\dfrac{1}{6}\cos(2y^2) + C$.　　　　(B) $-\dfrac{1}{4}\cos(2y^2) + C$.

   (C) $-\dfrac{1}{8}\cos(2y^2) + C$.　　　　(D) $-\dfrac{1}{2}\cos(2y^2) + C$.

6. Find the define integral, $W = \int_0^{\pi/2} \sin(\theta) * \cos(\theta) * d\theta = ?$ (5%)

   (A) 2.　　　　(B) 4.　　　　(C) 1/2.　　　　(D) 1/4.

7. Find the indefinite integral by using integration by parts: $\int y^5 * e^{y^3} * dy = ?$ （5%）

(A) $e^{y^3}[\ y^3 - 1] + C.$

(B) $\frac{1}{3} e^{y^3}[\ y^3 - 1] + C.$

(C) $3e^{y^3}[\ y^3 - 1] + C.$

(D) $e^{y^3}[\ 3y^3 - 1] + C.$

8. Assume a firm can sell q items for p = 250 - 0.01q dollars apiece, and it costs the firm c(q) = 1000 + 25q dollars to produce the q items. Find the production quantity and the sale price per item required to maximize profit. （5%）

(A) 10,000 watches at $150.00 each.

(B) 11,250 watches at $248.89 each.

(C) 11,250 watches at $137.50 each.

(D) 13,750 watches at $112.50 each.

9. Evaluate the result of the following double integral: $\int_0^3 \int_0^{x^2} \sin(x^3) * dy * dx.$ （5%）

(A) $\frac{1 + 2\cos(27)}{3}.$

(B) $\frac{1 + \cos(27)}{3}.$

(C) $\frac{1 - \sin(27)}{3}.$

(D) $\frac{1 - \cos(27)}{3}.$

10. Find the following integral: $\int_0^1 (y^2 + 1) * e^{-y} dy = ?$ （5%）

(A) $e^{-1} + 3.$

(B) $4e^{-1} + 3.$

(C) $3e^{-1} + 3.$

(D) $6e^{-1} + 3.$

二、計算題: (每題 10%)

1. Find the slope of the graph of the function $(x^2 + y^2)^2 = 8x^2y$ at the point (2, 2). （10%）

2. Find the derivative of $f(x) = \left(\frac{3x-1}{x^2+3}\right)^2.$ （10%）

3. Find the integral $\int x\sqrt{x^2 - 1}\, dx.$ （10%）

4. Find the integral $\int x^2 \ln(x)\, dx.$ （10%）

5. Find the maximum of $V = xyz$, subject to the constraint $6x + 4y + 3z - 24 = 0.$ （10%）

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