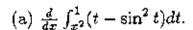
因立中央大學八十九學年度轉學生入學試題卷

I 資電 北科學院 二年級

科目: 微積分

- 共一頁 第一頁
- 1 (10 points) Evaluate the given integrals.
 - (a) $\int \frac{\sin x}{1+\sin^2 x} dx$.
 - (b) $\int \cos(\ln x) dx$.
- 2 (10 points) Perform the following differentiations.



- (b) $\frac{d}{dx}[x^{(2^x)}].$
- 3 (10 points) (a) Find the area of the region that consists of all points that lie within the circle $r = 2\cos\theta$ but outside the circle r = 1.
 - (b) Find the points of the cardioid $r = 1 \cos \theta$ at which the tangent line is vertical.
- 4 (10 points) Find the indicated limits.
 - (a) $\lim_{x \to \infty} \frac{1}{x} \int_0^x \sin(\frac{1}{t+1}) dt$.
 - (b) Find the limit of the sequence: $\lim_{n\to\infty} (\sqrt{n}-1)^{\frac{1}{\sqrt{n}}}$.
- 5 (10 points) Given an ϵ , δ proof that

$$\lim_{x \to c} \sqrt{x} = \sqrt{c} \text{ for } c > 0.$$

6 (10 points) Find the extreme values and the saddle points (if any) of

$$f(x,y) = x^4 - 2x^2 + y^2 - 2.$$

- 7 (10 points) Expand the following functions f in powers of x
 - (a) $f(x) = \ln(1-x^2), x \in (-1,1).$
 - (b) $f(x) = \int_0^x \frac{1-\cos t}{t^2} dt$.
- 8 (10 points) Evaluate

$$\int_C x^2 y dx + xy dy,$$

where C is the circular path $y = \sqrt{1 - x^2}$ connecting (1,0) to (0,1).

- 9 (10 points) Find the volume of the solid bounded by the circular cylinder $x^2 + y^2 = 1$, the plane z = 0, and the plane x + z = 1.
- 10 (10 points) (a) Show that the polynomial function $p(x) = 2x^3 + 5x 1$ has exactly one real zero.
 - (b) Prove that for all real x and y

$$|\cos x - \cos y| \le |x - y|.$$