東吳大學 109 學年度暑假轉學生招生考試試題

系級	經濟學系二年級	考試時間	100 分鐘
科目	微積分	本科總分	100 分

※一律作答於答案卷上(題上作答不予計分)；並務必標明題號，依序作答。

Please show all your work.

1. (5 points) Find the limit: $\lim_{x\to 0}\dfrac{\sqrt{x+1}-1}{x-3}$.

2. (5 points each part) Find the derivative of each function.

   (a) $f(x)=\left(\dfrac{1}{x}+1\right)(x-1)$ (b) $y=\dfrac{3-(1/x)}{x+5}$ (c) $y=\left(\dfrac{3x-1}{x^2+3}\right)^2$ (d) $f(x)=\ln\left[x\left(x^2+1\right)^2\right]$.

3. (5 points) Solve the equation: $300=\left(\dfrac{100}{e^{2k}}\right)e^{4k}$.

4. (10 points) The marginal cost of producing x units of a product is modeled by $\dfrac{dC}{dx}=32-0.04x$. It costs \$50 to produce one unit. Find the cost of producing 200 units.

5. (5 points each part) Find each indefinite integral.

   (a) $\int\dfrac{-4x}{\left(1-2x^2\right)^2}dx$ (b) $\int\dfrac{3}{3x+1}dx$ (c) $\int\dfrac{1}{1+e^{-x}}dx$.

6. (10 points) Find $\int x^2e^x dx$.

7. (10 points) Evaluate $\int_1^e \ln x\, dx$.

8. (10 points) Find $\int\dfrac{x}{\sqrt{x-1}}dx$.

9. (5 points) Find the first partial derivatives of $f(x,y)=xe^{x^2y}$ and evaluate each at the point (1, ln2).

10. (10 points) A rectangular box is resting on the xy-plane with one vertex at the origin. The opposite vertex lies in the plane $6x+4y+3z=24$. Find the maximum volume of the box.