系別：商管組二年級　　　　科目：微　積　分

准帶項目請打「○」否則打「x」	
X	簡單型計算機

一、填充題 (共 10 題, 每小題 7 分)
　　請依順序寫上小題號及答案, 不必寫出計算過程.

1. $\lim\limits_{x \to \infty} \dfrac{3x^2 + 8x - 4 + \frac{1}{x}}{2x^2 + 4x - 5} = $ _____

2. $\lim\limits_{h \to 4} \dfrac{\sqrt{h} - 2}{h - 4} = $ _____

3. $\lim\limits_{m \to \infty} (1 + \dfrac{3}{m})^{\frac{m}{2}} = $ _____

4. $\dfrac{d}{dx} \ln \dfrac{x + 1}{x - 1} = $ _____

5. $\dfrac{d}{dS} S^{S+1} = $ _____

6. $\dfrac{d}{dx} e^{\sin 2x + \cos \sqrt{x}} = $ _____

7. $\displaystyle\int_1^2 (1 + \dfrac{1}{u} + \dfrac{1}{u^2})\,du = $ _____

8. $\displaystyle\int_0^2 \int_{x^2}^4 x e^{y^2}\,dy\,dx = $ _____

9. $\displaystyle\int x \ln(x + 1)\,dx = $ _____

10. $\displaystyle\int_0^{e^x} \dfrac{\sin(\ln x)}{x}\,dx = $ _____

二、計算題 (每題 10 分, 共 30 分)
　　一定要有計算過程, 否則不予計分.

1. Find the equation of the tangent line of $f(x)$ when $x = 2$, where $f(1) = e$ and $\dfrac{df(x)}{dx} = 3x^2 f(x)$.

2. The altitude (in feet) of a rocket t seconds into flight is given by

$$S = f(t) = -t^3 + \dfrac{177}{2}t^2 + 180t + 10 \quad (t \geq 0).$$

a). Find the maximum altitude attained by the rocket.

b). When will the the rocket attain its maximum velocity.

3. Find the Taylor series of the function $\dfrac{x^2}{1+x^3}$ at $x = 0$, and give the interval of convergence for the series.