

考試科目	微積分	所別	4152 企管系乙組	考試時間	2月26日(星期日) 下午 13:20 ~ 15:00	第 3 節
<p>1. During a medical procedure, the size of a roughly spherical tumor is estimated by measuring its diameter and using the formula $V = \frac{3}{4}\pi R^3$ to compute its volume. If the diameter is measured as 2.5 cm with a maximum error of 2%, how accurate is the volume measurement? (10%)</p> <p>2. Suppose that you own a parcel of land whose market price t years from now will be $V(t) = 20e^{\sqrt{t}}$ thousand dollars. If the prevailing interest rate remains constant at 7% compounded continuously, when will the present value of the market price of the land be greatest? (10%)</p> <p>3. An editor has been allotted \$60,000 to spend on the development and promotion of a new book. It is estimated that if x thousand dollars is spend on development and y thousand on promotion, approximately $f(x, y) = 20x^{3/2}y$ copies of the book will be sold.</p> <p>a. How much money should the editor allocate to development and how much to promotion in order to maximize sales? (10%)</p> <p>b. Suppose the editor is allotted \$61,000 instead of \$61,000. Estimate how the additional \$1,000 will affect the maximum sales level. (10%)</p> <p>4. John is considering a 5-year investment, and estimates that t year from now it will be generating a continuous income stream of $3000 + 50t$ dollars per year. If the prevailing annual interest rate remains fixed at 4% compounded continuously during the entire 5-year term, what should the investment be worth in 5 years? (20%)</p> <p>5. An oil well that has just been opened is expected to yield 300 barrels of crude oil per month and at that rate, is expected to run dry in 3 years. It is estimated that t months from now, the price of crude oil will be $28 + 0.3\sqrt{t}$ dollars per barrel. If the oil is sold as soon as it is extracted from the ground, what is the total revenue generated by the well during its operation? (20%)</p> <p>6. A patient is given an injection of 10 units of a certain drug every 24 hours. The drug is eliminated exponentially so that the fraction that remains in the patient's body after t day is $f(t) = e^{-t/5}$. If the treatment is continued indefinitely, approximately how many units of drug will eventually be in the patient's body just prior to an injection? (20%)</p>						
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