

淡江大學九十二學年度碩士班招生考試試題

系別：產業經濟學系

科目：微 積 分

准帶項目請打「○」否則打「×」
簡單型計算機
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本試題共 / 頁

每題十分 詳列過程

1. Determine whether the series, $\sum_{n=1}^{\infty} \frac{n \cos n\pi}{1+n^2}$, is convergent or divergent ?
2. Determine whether the improper integral $\int_1^{\infty} (\ln x)^{-\frac{1}{2}} \frac{1}{x} dx$ is convergent or divergent ?
3. Evaluate the given integral $\int x^3 \sqrt{1+x^2} dx$.
4. Find the minimum value of the function $f(x, y, z) = 4xy + 6xz + 6yz$ subject to the constraint $xyz = 144$.
5. Find and classify all relative extrema for the function $f(x, y) = x^4 + y^4 - 4xy$
6. Evaluate the given double integral $\int_0^1 \int_1^2 xe^{y^2} dy dx$
7. Mr. Henry is now age 40. He wishes to fund an annuity, making a single payment now, that will pay him \$20000 per year for 10 years, beginning age 60. Assuming a prevailing interest rate is 5% for the entire 30-year period (age 40 to age 70), what should Mr. Henry expect to pay as the single premium ?
8. If the demand equation is given by $D(x) = 45 - 0.18x^2$ and the supply equation is given by $S(x) = 0.12x^2 + 1.5x$, find the consumer' surplus and the producers' surplus at the equilibrium point.
9. Demand for product A at price p and product B at price q are given as follows
 Product A $f(p, q) = \frac{10p}{4p+2q}$ Product B $g(p, q) = \frac{30q}{2p+5q}$
 Determine whether product A and product B are competitive or complementary.
10. A major audio-tape manufacturer is willing to make x thousand 12-packs of metal alloy audiocassette tapes per week available in the marketplace when the wholesale price is \$p per 12-pack. It is known that the relationship between x and p is governed by the supply equation

$$x^2 - 3xp + p^2 = 5.$$
 How fast is the supply of tapes changing when the price per 12-pack is \$11, the quantity supplied is 4000 12-pack, and the wholesale price per 12-pack is increasing at the rate of 10 cents per 12-pack per week ?