

大同大學 101 學年度轉學入學考試試題

考試科目:微積分

所別:各系所

第 1 頁

註:本次考試 不可以參考自己的書籍及筆記; 不可以使用字典; 不可以使用計算器。

10% 1) Evaluate the following limits:

a) $\lim_{x \rightarrow 2} \frac{x^2 - 4}{x - 2}$. b) $\lim_{x \rightarrow 0} \frac{e^{2x} - 1}{x}$.

15% 2) Find the derivative of the following functions:

a) $f(x) = (x^2 - 1)^6$. b) $g(x) = e^{-2x} \sin(3x)$. c) $h(x) = \int_0^{3x} t \sin(t) dt$.

10% 3) Find the minimum distance from the parabola $y = \frac{1}{4}x^2$ to the point (1,2).

15% 4) Find the following indefinite integrals:

a) $\int x e^{2x} dx$. b) $\int \sin(x) \cos(x) dx$. c) $\int \frac{x^2 + x - 4}{x^2 - 4} dx$.

15% 5) Evaluate the following definite integrals:

a) $\int_0^{\pi/2} \sin(2x) dx$. b) $\int_0^2 |x - 1| dx$. c) $\int_0^1 \frac{e^x + 1}{e^x + x} dx$.

10% 6) Find the relative minimum of the function $f(x, y) = x^3 + 3xy - y^3$.

10% 7) Find the radius of convergence for the series $\sum_{n=0}^{\infty} (-1)^n \frac{(5x-1)^n}{n+1}$.

7% 8) Evaluate the iterated integral $\int_0^{\pi} \int_y^{\pi} \frac{\sin x}{x} dx dy$.

8% 9) Evaluate the double integral $\iint_R xy dA$, where R is the triangle bounded by the lines $y = 4 - x$, $y = 0$, and $x = 0$.