

大同大學 101 學年度(寒)轉學入學考試試題

考試科目:微積分

所別:各系所

第 1/1 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) $\lim_{x \rightarrow 3^+} \frac{6-2x}{|x-3|}$.

b) $\lim_{x \rightarrow 0} \frac{6x}{\sqrt{3x+3} - \sqrt{3}}$.

25% 2) Find the derivative of the following functions:

a) $f(x) = \frac{\sin(x)}{e^x + 1}$.

b) $f(x) = (x^2 + x + 1)^{101}$.

c) $f(x) = e^x \sin(3x)$.

d) $f(x) = \int_0^x t^2 \sin(t) dt$.

e) $f(x) = \ln \left[\frac{(x+1)^2 \sqrt{x^2+1}}{(x^2+2)^4} \right]$.

10% 3) Find the points on the graph of $y = 2x^2$ that are closest to(最靠近於) the point (0,2).

10% 4) Find $\frac{dy}{dx}$ for the equation $y^2 + xy + x^3 = 1$.

25% 5) Find the following indefinite integrals:

a) $\int \cos(x) + 2e^{2x} dx$.

b) $\int x\sqrt{2x+3} dx$.

c) $\int x[x + \sin(x^2)] dx$.

d) $\int \frac{\ln(x^2)}{x} dx$.

e) $\int \frac{x^2 + 2x + 1}{x^2 + 1} dx$.

20% 6) Evaluate the following definite integrals:

a) $\int_0^1 (x+1)^9 dx$.

b) $\int_0^\pi \cos(x + \pi) dx$.

c) $\int_0^1 \frac{x}{x^2+1} dx$.

d) $\int_{-1}^1 f(x) dx$, where $f(x) = \begin{cases} e^x, & x < 0 \\ e^{3x}, & x \geq 0 \end{cases}$.