元智大學 107 學年度 轉學考 招生試題卷

系(所)別：電機工程學系學士班　組別：電機工程學系乙組2年級　科目：微積分　用紙第 1 頁共 1 頁

●不可使用電子計算機

計算題(第 1 至 10 題每題答對得 10 分)

1. Find the derivative for $f(x) = \frac{x^2 - 3x}{x^2}$.
2. Find the derivative for $y = \arctan e^x$.
3. Evaluate the integral: $\int_{1/2}^{1} \frac{\sqrt{1 - x^2}}{x} dx$.
4. Evaluate the integral: $\int_0^{\sqrt{\pi}} \int_{\pi/6}^{y^2} 2ycosx \ dxdy$.
5. Evaluate the integral: $\int_0^2 \int_{y/2}^1 e^{x^2} \ dxdy$ by reversing the order of integration.
6. Find the area enclosed by the curve $r = 2cos3\theta$.
7. Evaluate the integral: $\int_0^3 \int_0^{\sqrt{9-y^2}} y \ dxdy$ using polar coordinates.
8. Write the first four terms of the Taylor series expansion for $f(x) = xe^x$ about $c = 0$.
9. Find the directional derivative of the function $f(x,y) = 3x - 4xy + 9y$ at the point P(1, 2) in the direction of $\bar{v} = \frac{3}{5}\bar{\imath} + \frac{4}{5}\bar{\jmath}$.
10. Find the volume in the first octant bounded by $z = 1 - y^2, y = 2x,$ and $x - 3$.