台灣聯合大學系統 106 學年度學士班轉學生考試試題

科目_微積分

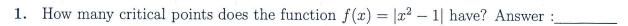
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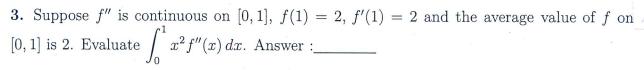
*請在答案卷內作答

甲、填充題:共8題,每題8分,共64分。請在答案卷上列出題號依序作答。

請注意:本(甲、)部分,共8題,命題型態為填充題,不必詳列計算過程,倘若答案被包含在演算過程,將被視為試算流程,無法計分。



2. If
$$\lim_{x\to 0} \frac{\sqrt{ax+b}-2}{x} = 1$$
, then $a-b = ?$ Answer :_____



4. Find
$$g'(-\frac{1}{2})$$
, where $g(x)$ is the inverse of $f(x) = \frac{x^3}{x^2 + 1}$. Answer :______

5. Find the directional derivative of
$$f(x,y) = \tan^{-1}(\frac{x}{y})$$
 at $P_0(1,1)$ in the direction of $\mathbf{v} = \frac{\sqrt{2}}{2}\mathbf{i} + \frac{\sqrt{2}}{2}\mathbf{j}$. Answer:

6. Evaluate
$$\int_0^6 \int_{x/3}^2 x \sqrt{y^3 + 1} \, dy dx$$
. Answer :______

7. Let R be the solid inside
$$x^2 + y^2 + z^2 = 1$$
, outside $z = \sqrt{x^2 + y^2}$ and above the xy-plane. Find the volume of R. Answer:_____

8. Evaluate the line integral
$$\int_C 2xy\,dx + (x^2+2x)\,dy$$
, where C : boundary of the region lying between the graphs of the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and the circle $x^2 + y^2 = 1$. Answer:

乙、計算、證明題:共3題,每題12分,共36分。須詳細寫出計算及證明過程,否則不予計分。

1 Find any extrema of the function $f(x,y) = e^{-xy/4}$ subject to the constraint $x^2 + y^2 \le 1$.

2. For the function

$$f(x,y) = \begin{cases} \frac{-5xy}{x^2 + y^2}, & \text{if } (x,y) \neq (0,0) \\ 0, & \text{if } (x,y) = (0,0) \end{cases}$$

show that $f_x(0,0)$ and $f_y(0,0)$ both exist, but that f is not differentiable at (0,0).

3. Determine whether the series $\sum_{n=3}^{\infty} \frac{\ln n}{\ln \ln n}$ converges absolutely or conditionally, or diverges.