國立臺北大學 108 學年度日間學士班轉學生招生考試試題

學制系級：電機工程學系日間學士班 3 年級

科　　目：工程數學

☐可 ☑不可使用計算機

1. (10%) Determine whether the given first-order differential equation is linear or nonlinear in the dependent variable of y.

   $(y^2-1)dx+xdy=0;\ \text{in } y$

2. (10%) The differential equation is $(1+\ln x+\frac{y}{x})dx=(1-\ln x)dy$.

   (1) Prove the given differential equation is exact.
   (2) If it is exact, solve the given initial-value problem.

3. (10%) Solve the given differential equation of $dy-(1+e^{y-x+5})dx=0$

4. (15%) Find the complementary (y_c) and particular solution (y_p) of $y''-4y'+4y=8x^2+12-16e^{2x}$

5. (15%) Evaluate the given Laplace transform of $L\{2+2t^4+e^{2t}+\sin 2t\}$

6. (15%) Find the given inverse Laplace transform of $L^{-1}\left\{\frac{2s-4}{(s^2+s)(s^2+1)}\right\}$

7. (10%) Let the vector field of $\mathbf{F}=4xy\mathbf{i}+(2x^2+2yz)\mathbf{j}+(3z^2+y^2)\mathbf{k}$, find (1) the curl and (2) the divergence.

8. (15%) The line integral is $\int_{(1,1)}^{(2,4)} 2xydx+x^2dy$

   (1) Prove the given line integral is independent of the path.
   (2) Find a potential function ϕ.
   (3) Find the given line integral.

試題隨卷繳交