

海大河工系工數二(B)第二次大考(二高階 ODE)

1. Solve the other two complementary solutions of $y'''=0$ except $y=\text{constant}$. (5%)
Solve the other two complementary solutions of $y'''-3y''+3y'-y=0$ except $y=e^x$ (5%)
2. Solve the total solution of $y''+y=\sin(\Omega t)$ subject to $y(0)=0$ and $y'(0)=0$ (10%)
(1) Explain the beating and resonance. (5%)
(2) Plot the beating and resonance. (5%)
3. Given $x=e^t$ and $y(x)=Y(t)$, express $x^3 y'''$ in terms of $Y(t)$ and its derivatives. (10%)
4. If $y=x$ is one complementary solution of $(1-x^2)y''-2xy'+2y=0$, find the other one. (10%)
5. Solve the two complementary solutions of $x^2 y''-2xy'-10y=0$. (5%)
6. Solve the particular solution of $x^2 y''-2xy'-10y=-12x$. (10%)
7. Explain the free vibration and forced vibration mathematically and physically. (5%)
8. Solve the complementary solution of $y'+y=0$. (5%)
9. Solve the particular solution of $y'+y=\cos(t)$. (5%)
10. Solve the particular solution of $y'+y=\sin(t)$. (5%)
11. Solve the particular solution of $y'+y=\sin(t)+\cos(t)$. (5%)
12. What is Wronskian? (5%) Determine the Wronskian of $\sin(x)$, $\cos(x)$ and e^{ix} . (5%) Are the three solutions independent? (5%)
13. Determine the Wronskian of $\sinh(x)$, $\cosh(x)$ and e^x . (5%) Are the three solutions independent? (5%)