常微与偏微课程作业

贾博方

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题目1.

$$\frac{d^2y}{dt^2} - y = 0$$

解答.

$$t^2 - 1 = 0$$

$$t1 = 1 \quad t2 = -1$$

$$y1(t) = e^t \quad y2(t) = e^{-t}$$

$$y(t) = C1e^t + C2e^{-t}$$

题目2.

$$6\frac{d^2y}{dt^2} - 7\frac{dy}{dt} + y = 0$$

解答.

$$6t^2 - 7t + 1 + 0$$

$$t1 = 1 \quad t2 = \frac{1}{6}$$

$$y1(t) = e^t \quad y2(t) = e^{\frac{1}{6}t}$$

$$y(t) = C1e^t + C2e^{\frac{1}{6}t}$$

题目3.

$$\frac{d^2y}{dt^2}+\frac{dy}{dt}+y=0$$

解答.

$$t^2+t+1=0$$

$$t1=\frac{-1+\sqrt{3}}{2}\quad t2=\frac{-1-\sqrt{3}}{2}$$

$$y(t)=e^{r1t}=e^{\frac{-1-\sqrt{3}}{2}t}$$

$$=e^{\frac{-t}{2}}C1\cos\frac{\sqrt{3}t}{2}+ie^{\frac{-t}{2}}C2\sin\frac{\sqrt{3}t}{2}$$

题目4.

$$2\frac{d^2y}{dt^2}+3\frac{dy}{dt}+4y=0$$

解答.

$$2t^2+3t+4=0$$

$$t1=\frac{-3+\sqrt{23}}{4}\quad t2=\frac{-3-\sqrt{23}}{4}$$

$$y(t)=e^{r1t}=e^{\frac{-3-\sqrt{23}}{4}t}$$

$$=e^{\frac{-3t}{4}}C1\cos\frac{\sqrt{23}t}{4}+ie^{\frac{-3t}{4}}C2\sin\frac{\sqrt{23}t}{4}$$

题目5.

$$\frac{d^2y}{dt^2}-6\frac{dy}{dt}+9y=0$$

解答.

$$t^2-6t+9=0$$

$$(t-3)^2=0$$

$$r1=r2=3$$

$$y(t)=C1e^{3t}+C2te^{3t}$$

题目6.

$$4\frac{d^2y}{dt^2} - 12\frac{dy}{dt} + 9y = 0$$

解答.

$$4t^2 - 12t + 9 = 0$$

$$(2t-3)^2 = 0$$

$$r1 = r2 = \frac{2}{3}$$

$$y(t) = C1e^{\frac{2}{3}t} + C2te^{\frac{2}{3}t}$$