Second Midterm—Chapter 2

Total points: 100 points 2 hours to do the work, Nov. 29, 2018

1. Consider the 2nd order differential equation
2. Reduce the 2nd order differential equation to a 1st order differential equation if one solution of the above 2nd order differential equation is . (5%)

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→

→

→ **→ 代入化簡錯誤+3**

原式 →

→

→ **→ +4**

, 原式 → **→ +5**

1. Solve the 1st order differential equation in (A). (4%)

→ **→ +2**

**→ +3**

**→ +4**

1. Find the second solution for the 2nd order differential equation. (3%)

→

→ **→ +2**

∵

∴ **→ +3**

1. Solve the 2nd order differential equation with and . (3%)

**解出 → +2**

,

∴ **→ +3**

1. Consider the 2nd order differential equation
2. Find the homogeneous solution . (3%)

→ →

原式 →

→ →λ=1,1(重根) **→ +2**

∴ **→ +3**

1. Find the particular solution using **the Method of Undetermined Coefficients**. (10%)

**→ +4**

→

→

原式 →

→ → → **→ +7**

→

→

原式 → → B=1 ,C=2 → **→ +9**

∴ **→ +10**

1. Find the general solution. (2%)
2. Consider the 2nd order differential equation
3. Find the homogeneous solution . (3%)

→ →

原式 →

→ → **→ +2**

∴ **→ +3**

1. Find the particular solution using **the Method of Variation of Parameters**. (10%)

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**→ +2**

**→ +3**

**→ +4**

**→ 代錯+5**

**→ +6**

= **→ +9**

= **→ +10**

1. Find the general solution. (2%)
2. Solve the initial value problem to find the general solution. (15%)

→ →

原式 → → **→ +3**

**解出 → +9**

**解出 → +5**

∴ **→ +10**

→ **→ +13**

→ → **→ +14**

∴ **→ +15**

1. Consider the two functions described in (A) and (B), respectively. (i) Find a second-order homogeneous linear differential equation for which the given functions are solutions. (ii) Show linear independence by their **Wronskian**.

**解出 → +5**

**解出b → +8 解出c → +9**

1. (15%)
2. ,

**→ +6**

*,*

代入得 →

代入得 →

∴

∴ **→ +10**

1. **→ 計算出結果+3,表達出** **+2**

∴

**解出→ +5**

1. (15%)

**→ +6**

→

∴

**解出b → +8 解出c → +9**

∴ **→ +10**

1. **→ 計算出結果+3,表達出** **+2**

∴

1. Given a 2nd order differential equation : .

Let and transfer the given differential equation to be a differential equation with constant coefficients with respect to *u*. (10%)

**→ +1**

**→ +1**

**→ +1**

原式 →

→ **→ +10**