MTH240-02 DIFFERENTIAL EQUATIONS & COMPUTER EXPERIMENT1(English)

Department: ID Number: Name:

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1. Consider the Bessel equation.

(a) Write the Bessel equation of order three.

(b) By using (a), find the indicial equation.

(c) Find the recurrence relation.

2. Consider a function,

$$f(x) = \frac{1}{(x+1)^3(x+2)^3(x+3)^3 \cdots (x+9)^3(x+10)^3}.$$

Then calculate the second derivative of $f(x)$, i.e., $f''(x)$.

3. Consider

$$\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0. \tag{1}$$

With the relation $t = \lambda x^2$, change the variable from x to t in Eq. (1). Here, $\lambda > 0$ and $x > 0$.