Sulerman Abdullati Eatun
17 |filgo 10 \& 6
mectiatronics Engineéring
$(1)$

$$
\begin{aligned}
& y=e^{x^{2}+x} \\
& \frac{d u}{d x}=2 x+1 \\
& y=e^{u} \frac{d y}{d u}=e^{v} \\
& \frac{d y}{d x}=\frac{d y}{d u} \times \frac{d u}{d x} \\
& =e^{u}(2 x+1) \\
& =(2 x+1) l^{x^{2}+x} \\
& \frac{d^{2} y}{d x^{2}}=y^{\prime \prime}=\frac{u d v}{d x}+\frac{v d u}{d x} \\
& =(2 x+1)(2 x+1) e^{4}+e^{x^{2}+x}(2) \\
& \begin{array}{r}
\text { hecal } y_{y^{\prime}}=(2 x+1)
\end{array} \\
& y_{y^{\prime}}^{\prime}=(2 x+1) e^{\prime \prime} \\
& \therefore y^{\prime \prime}=(2 x+1) y^{\prime+2 y} \\
& \text { from } y^{\prime \prime} \\
& \begin{aligned}
& \therefore y^{(n)}-(2 x+1) y^{(n-1)}+2(n-1) y^{n} \\
& y^{(n+2)}=(2 x+1) y(n+2-1)+2(u+2-1) y \\
& y^{(n+2)}=(2 x+1) y^{(n+1}+2(n+1) y^{n}
\end{aligned}
\end{aligned}
$$

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$$
\begin{aligned}
& =y^{(n+1)} x_{3}+n_{y}(n) \\
& W_{3}=y^{\prime} \\
& U=y^{\prime} \\
& U=y^{(n)}=y^{(n)} \\
& W_{3}=U^{(n)} V \\
& W_{3}=y^{n} \\
& W^{(n)}+U_{2}^{(n)}+W_{3}^{(n)}=0 \\
& x^{2} y^{(n+2)}+n_{y}^{(n+1)} 2 x+n(n-1) y^{n}+y^{(n+1)} x+n_{y}^{(n)}+y^{(n)}
\end{aligned}
$$

$$
\begin{aligned}
& x^{2} y^{(n+2)}+x(1+2 n) y^{(n+1)}+\left(n^{2}-n+n+1\right) y^{(n)}=0 \\
& x^{2} y y^{(n+2)}+(20+1) x y^{(n+1)}+\left(n^{2}+1\right) y^{(n)}=0
\end{aligned}
$$

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$$
\begin{aligned}
& y=x^{3} e^{4 x} \\
& \sum_{i=0}^{u}{ }^{n} C_{r} u^{(v-r)} v^{r} \\
& V=x^{3}, v^{(1)}=3 x^{2}, v^{(2)}=6 x, v^{(3)}=6, v^{(4)}=0, v^{(5)}=0 \\
& \begin{array}{l}
u=e^{4 x}, u^{(1)}=4 e^{4 x}, u^{(2)}=16 e^{4 x}, u^{(3)}=64\left(l^{4 x}, u^{(4)}=256 e^{4 x},\right.
\end{array} \\
& y^{5}=1024 e^{4 x}=256 e^{4 x} \text {, } \\
& \begin{aligned}
y^{5}= & u^{(5)} v+5 u^{(5-1)} v^{(1)}+{ }^{5} C_{2} u^{(500)} v^{(2)}+5 C_{3} u^{(5-3)} v^{(3)} \\
& +{ }^{5}\left(1 u^{(5-4)} v^{(4)}\right.
\end{aligned} \\
& +{ }^{5} C_{4} U^{(5-4)} V^{(4)} \\
& =u^{(5)} v+5 u^{(4)} v u^{(1)}+{ }^{5} C_{2} u^{(1)} v^{(2)}+{ }^{5} C_{3} u^{(2)} u^{(3)}+{ }^{5} C_{1} u^{(5)} v^{(4)} \\
& =\log 4 e^{4 x} x^{3}+3840 e^{4 x}+38-40 e^{4 x} x+960 e^{4 x}+0 \\
& y^{(5)}=\left(e^{4 x}\left(1024 x^{3}+3840 x^{3}+38040 x+960\right)\right. \\
& \text { (11) } x^{2} \frac{d^{2} y}{d x^{2}}+\frac{x d y}{d x}+y=0 \\
& x^{2} y^{\prime \prime}+x y^{\prime}+y=0 \\
& x^{2} y^{\prime \prime}=\omega_{1} \\
& V=x^{2}, V^{(1)}=2 x, V^{(2)}=2 \\
& u=y^{\prime \prime}, u^{(1)}=y^{(3)}, u^{(2)}=y^{(4)}, u^{(n)}=y^{(n+2)} \\
& \omega_{1}^{(n)}=\sum_{r=0}^{n}{ }^{n} C_{r} U^{(n-r)} v^{r}, u^{(n)}=Y(n+2) \\
& =U^{(n)} V+n u^{(n-1)} U^{(1)}+{ }^{n} C_{2} u^{(n-2)} V^{(n)} \\
& =u^{(n)} v+n u^{(n-1)} v^{(1)}+\frac{n(n-1) y^{n}(2)}{2} \\
& w_{1}^{(n)}=y^{(n+2)} x^{2}+n y^{(n+1)} 2 x+n(n-1) y^{n} \\
& \begin{array}{l}
x y^{\prime}=w_{2} \\
v=x, v^{(1)}=1
\end{array} \\
& u=y^{(1)}, u^{(1)}=y^{(2)} \quad u^{n}=y^{(n+1)} \\
& \omega_{2}=u^{(n)} v+n u^{(n-1)} v^{(1)}
\end{aligned}
$$

