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| **Question I** A. For the differential equation$$e^{x-y}+e^{y-x}\frac{dy}{dx}=0$$ answer the following(i) Classify the differential equation by type, order and linearity.(ii) Verify that the expression$$e^{2x}+e^{2y}=1$$is an implicit solution of the differential equation.  **Question III**: A. Solve the following differential equations$(1) \left(x^{2}-xy+y^{2}\right)dx=xydy$ (2) $ \frac{dy}{dx}-sin\left(4x-y+5\right)$= 4B. Solve the Initial Value Problem$$\left(e^{x}+y\right)dx+\left(2+x+ye^{y}\right)dy=0, y\left(0\right)=1.$$Good Luck☺ |
| (iii) Find an explicit solution $y=∅\left(x\right).$(iv) Give the interval I of definition of the explicit solution in (iii). (Bonus Question) B. Determine the region of the $xy-plane$ for which the differential equation has a unique solution$$(4-y^{2})\frac{dy}{dx}=x^{2}.$$**Question II:** Solve the following differential equations1.$$dy-\left(e^{x^{2}}+2xy\right)dx=0$$ 2.$$xy^{2}dx+\left(1-x\right)dy=0$$3.$$xdy-\left(y+xe^{\frac{y}{x}}\right)dx=0$$**Question III**: Show that the following differential equation is exact. Then solve the initial value problem$$( x^{3}+xy^{2}sin2x+y^{2}sin^{2}x)dx+(2xysin^{2}x)dy=0, y\left(0\right)=0.$$ |

Good Luck ☺