Solution of Problem 1

Write as: $ydy = x\ln(x)dx$

$$\int y\,dy = \int x\ln(x)\,dx \qquad \text{(8 points)}$$

$$\int y\,dy = uv - \int v\,du, \text{ where } u = \ln x\,, dv = xdx\,, du = \frac{1}{x}dx\,, v = \frac{x^2}{2} \qquad \text{(7 points)}$$

$$\int y\,dy = \frac{x^2\ln(x)}{2} - \int \frac{x}{2}dx$$

$$\frac{y^2}{2} = \frac{x^2\ln(x)}{2} - \frac{x^2}{4} + C$$

$$y^2 = x^2\ln(x) - \frac{x^2}{2} + C \qquad \text{(5 points)}$$