R. Bruner
Math 2150, Fall 2005, Solution to Quiz 2
September 14, 2005

1. If $y' = xy - x = x(y-1)$ then

$$\frac{dy}{y-1} = x\ dx$$

Integrating, we get

$$\begin{aligned} \ln|y-1| &= x^2/2 + C \\ |y-1| &= e^{(x^2)/2+C} = e^C e^{x^2/2} \\ y-1 &= Ae^{x^2/2} \\ y &= 1 + Ae^{x^2/2} \end{aligned}$$

where $A = \pm e^C$ at first, but, upon inspection, can be 0 as well, so can be any real number.

2. If $2 = 1 + Ae^0 = 1 + A$ then $A = 1$ so $y = 1 + e^{x^2/2}$.

3. If $1 = 1 + Ae^0 = 1 + A$ then $A = 0$ so $y = 1$, a constant solution.