AP CALCULUS AB

For problems **1** and **2**, verify the indefinite integrals by differentiation.

1)

$$\int e^{-x} \sin x \ \mathrm{d}x =$$
$$= -\frac{1}{2} e^{-x} (\sin x + \cos x)$$

2)

$$\int x^2 e^x \, \mathrm{d}x =$$
$$= x^2 e^x - 2x e^x + 2e^x$$

THE SIMPLE FIRST-ORDER LINEAR DIFFERENTIAL EQUATION

3) Solve

$$\frac{\mathrm{d}y}{\mathrm{d}x} + y = x^2$$

for $y = y(x)$ subject to the initial condition $y(1) = 2$. *Hint:* $k = 1$. Also, you will need to use the integral from problem **2**.