Name: _____

Solve the differential equation.

1. $\dfrac{dy}{dx} = x^2 \ln x$

2. $\dfrac{dy}{dx} = \cos^2 y$ and $y = 0$ when $x = 0$

3. $\dfrac{dy}{d\theta} = \theta \sec \theta \tan \theta$

4. $\dfrac{dy}{dx} = e^{x-y}$ and $y = 2$ when $x = 0$

5. $\int_0^2 e^{2x}\, dx =$

(A) $\dfrac{e^4}{2}$ (B) $e^4 - 1$ (C) $e^4 - 2$ (D) $2e^4 - 2$ (E) $\dfrac{e^4 - 1}{2}$

6.

If $\int x^2 \cos x\, dx = h(x) - \int 2x \sin x\, dx$, then $h(x) =$

(A) $2 \sin x + 2x \cos x + C$

(B) $x^2 \sin x + C$

(C) $2x \cos x - x^2 \sin x + C$

(D) $4 \cos x - 2x \sin x + C$

(E) $(2 - x^2) \cos x - 4 \sin x + C$

BONUS:

7. If the substitution $\sqrt{x} = \sin y$ is made in the integral $\displaystyle\int_0^{1/2} \frac{\sqrt{x}}{\sqrt{1-x}}\, dx,$ rewrite the integral in terms of y.