Your Name: _____

1. Compute $\displaystyle\int 6x^{-2} - 12x^{-1} + 8\,dx$

2. Find the particular solution to the differential equation $\dfrac{dy}{dx} = e^{5x} + 3\sqrt{x}$, where $y = \dfrac{6}{5}$ when $x = 0$.

3. Find a general solution to the differential equation $3t \cdot \dfrac{dx}{dt} = x^{-2}$.

4. Verify that $y = e^{-3x} + e^x$ is a solution to the differential equation $y'' = 3y - 2y'$.

5. According to Robert Solow's economic theory, when a portion of all output is reinvested in capital, the rate of change in capital stock, K (in thousands of dollars), can be written in terms of capital stock and time t years from now by the differential equation

$$\frac{dK}{dt} = Se^{bt}K^{1-a},$$

where a, b, and S are all positive constants. Given $K(0) = 1600$, $a = 0.5$, $b = 0.02$, and $S = 2$, find **and interpret including units** the value of $K(5)$. [Hint: in your solution choose the less negative option for the constant]