NAME

Time: 15 minutes

Instructions. This quiz will be graded for accuracy, out of 10 points. Calculators, books, notes and suchlike aides to gracious living are not permitted. Make sure to show all your work for full credit.

1. (1 point) Fill in the blank below:

If \( \frac{dy}{dx} = ky \), Then \( y = \) ___________

2. (1 point) Write Newton’s Law of Cooling using the following:

\[ T = \text{the varying temperature of an object.} \]
\[ T_s = \text{temperature of surroundings.} \]
\[ T(0) = \text{temperature of the object at time } t = 0. \]

\[ T = \]

3. In the following problems solve the differential equation with initial condition:

(a) (2 points) \( \frac{dr}{dq} = 16q^3 + 2q \), \( r(1) = 10 \).

(b) (2 points) \( \frac{dr}{dq} = 4r \), \( r(1) = 10 \).
4. (4 points) A plane flying horizontally at an altitude of 2 miles and a speed of 600 miles/hour passes directly over a radar station. Find the rate at which the distance from the plane to the station is increasing when it is 3 miles away from the station.