Name: **Date:**   **Quiz 5**   **AP Calculus - Hargus**

Instructions: Please **show all work** (partial credit will be given for correct work, even if your answer is wrong).

1. (15 points) Solve the limit.

   (a) $\displaystyle\lim_{x \to 5} \frac{1}{x - 2}$

   (b) $\displaystyle\lim_{x \to 2} \frac{x^3 - 8}{x^2 - 2}$

   (c) $\displaystyle\lim_{x \to \infty} \frac{\ln(x)}{x}$

2. (10 points) Use separation of variables to solve for the general solution to the differential equation $\dfrac{dy}{dx} - 5x^4 e^{-y} = 0$.

   $y = $ _____

3. (10 points) Solve the differential equation $\frac{dy}{dx} = 2xy$ for the particular solution with initial condition $y(1) = 1$.

   $y = $ _____

4. (20 points)

(a) Calculate the midpoint sum M_2 which approximates the integral $\int_0^4 x^2 dx$.

$$M_2 = \underline{\hspace{3cm}}$$

(b) Is M_2 above **larger** or **smaller** than $\int_0^4 x^2 dx$? (Circle your answer)

(c) Calculate the trapezoidal sum T_2 which approximates the integral $\int_0^4 x^2 dx$.

$$T_2 = \underline{\hspace{3cm}}$$

(d) Is T_2 above **larger** or **smaller** than $\int_0^4 x^2 dx$? (Circle your answer)

5. (20 points) Draw the slope field for the differential equation $\frac{dy}{dx} = x^2$. Then, draw the solution which has initial condition $y(1) = 2$.