

NAME_____

Instructions: Write the answers where indicated and give clear evidence of your reasoning (or points will be taken off). You may attach extra sheets with your work if it is organized enough to be helpful. Graphs should be clearly labeled. **Calculators are not permitted if they can store formulae or do symbolic mathematics (algebra & calculus).** Graphing is OK.

NOTE: The lines "KEY FORMULA OR METHOD" are provided so that if you are not going to solve the problem completely, you can show that you have some correct idea. They are not required. All answers should be as specific as possible. A "specific expression" is one you could show to someone who knows calculus, so that person could evaluate it without being shown the original problem or told anything. It should contain no expressions like " $f(x)$," only specific functions like " $\sin(x)$."

SCORING - DO NOT WRITE ANSWERS ON THIS PAGE:

1 | _____

2 | _____

3 | _____

4 | _____

TOTAL _____

NAME _____

1. Let $f(x) := \sum_{k=1}^{\infty} \frac{2x^k}{k 3^k}$.

a) (5 points) Find the interval of convergence of this function.

ANSWER: $f(x)$ converges for _____

b) (3 points) Evaluate:

$$f'(x) = \hat{A} \underline{\hspace{2cm}}$$

$$f'(0) = \underline{\hspace{2cm}}$$

$$f^4(0) = \underline{\hspace{2cm}}$$

c) (2 points) Sum the series and evaluate $f(x) = \underline{\hspace{2cm}}$
(No $\hat{A}$ allowed this time!)

KEY FORMULA OR METHOD (optional for partial credit) _____

2. (10 points - but no credit at all for the exact values of the integrals)

a) Evaluate the integral $\int_0^1 \sqrt{x+1} \, dx$ with the trapezoid rule, $n=4$:

$$\int_0^1 \sqrt{x+1} \, dx \approx \underline{\hspace{2cm}}$$

b) Evaluate the integral $\int_0^1 \sqrt{x+1} \, dx$ with Simpson's rule, $n=2$:

$$\int_0^1 \sqrt{x+1} \, dx \approx \underline{\hspace{2cm}}$$

KEY FORMULA OR METHOD (optional for partial credit) _____

NAME _____

3. (10 points). ("Gee whiz, it's just like one of the recommended study problems!")
Solve the following initial-value problem.

$$y' + 5y = 1, \quad y(1) = 2.$$

ANSWER: $y(x) =$ _____

KEY FORMULA OR METHOD (optional for partial credit) _____

4. (10 points). Let $A := \begin{bmatrix} -1 & 6 \\ 7 & -1 \end{bmatrix}$, $B := \begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 1 & 1 \end{bmatrix}$, $v = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$, and $w = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$.

Calculate the following or else state why one cannot.

a) $(v - 2w) =$ _____

b) $Bv =$ _____

c) $AB =$ _____

d) $BA =$ _____

KEY FORMULA OR METHOD (optional for partial credit) _____
