

YOUR NAME: _____

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Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Solve the initial value problem

$$(\ln y)y' - ty = 0, \quad y(6) = 1, \quad y \geq 1.$$

2. Compute $T_3(x)$ if $f(x) = \sqrt{x}$ and $a = 4$.

3. (a) Pick a method out of the table in the last page and use it to show that the following recursively defined sequence converges or diverges.

$$b_0 = 1, \quad b_{n+1} = \frac{3}{n}b_n.$$

- (b) Pick a method out of the table in the last page and use it to show that the sequence diverges or, else, to find its limit. $a_n = \frac{2^{n+1} + 4 \cdot 3^n}{5^n}$, $n \geq 1$.

4. Use one of the methods in the table to tell whether the series diverges or to find its limit.

$$\sum_{n=1}^{\infty} \frac{2}{n(n+2)}.$$

5. Use one of the methods in the table to either show that the given series converges or that it diverges.

(a)
$$\sum_{n=4}^{\infty} \frac{\sqrt{n}}{n-3}$$

(b)
$$\sum_{n=1}^{\infty} \frac{\sqrt{n}}{n^2 - \ln n}$$

Pick one for each of the five parts in Problems 3-5 (must use all five). Explain all steps.

Geometric	Monotone and Bounded	Telescopic	Comparison	Limit Comparison
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