

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. Use the root or the ratio test to determine whether the given series converges or diverges.

(a) $\sum_{n=1}^{\infty} \frac{e^n}{n!}$

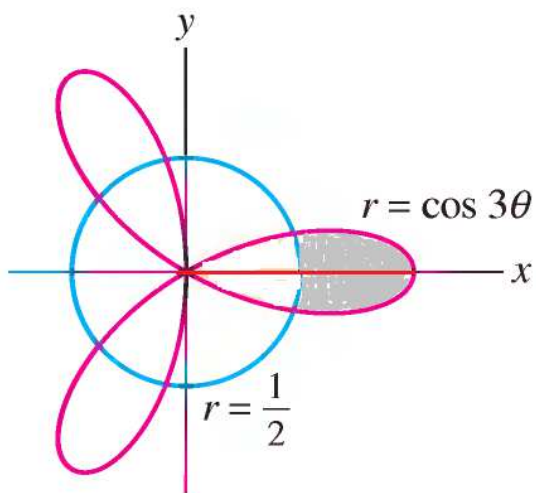
(b) $\sum_{n=0}^{\infty} \left(\frac{3n}{2n+1} \right)^n$.

2. Find the radius and interval of convergence of the power series

$$\sum_{n=0}^{\infty} \frac{(-5)^n}{n!} (x + 10)^n.$$

3. Consider the parametric curve $c(t) = (3t^2 - 2t, t^3 - 6t)$. Find the points on this curve where the tangent line has slope 3.

4. Find the area of the shaded region outside the circle $r = \frac{1}{2}$ and inside a petal of the curve $r = \cos 3\theta$.



5. Compute the length of the upper half of the cardioid $r = 1 - \cos \theta$ shown in the figure.

