1. Find the interval of convergence of the series   (4 points)

$$1 + \frac{2x}{\ln(2)+1} + \frac{4x^2}{\ln(3)+1} + \frac{9x^3}{\ln(4)+1} + \frac{16x^4}{\ln(5)+1} + \frac{25x^5}{\ln(6)+1} + \cdots$$

2. Find the Taylor polynomial of degree 3 for the function $f(x) = e^{2x}$ near the point $a = 1$.   (3 points)

3. If a function $g(x)$ is approximated near zero by the fourth degree Taylor polynomial $P_4(x) = 3 - 2x^2 - x^4$, what are $g(0)$, $g'''(0)$ and $g^{(4)}(0)$?   (3 points)