1. (30 pts.) Determine whether the following series converge:

(a) \[ \sum_{k=1}^{\infty} \frac{\log(k)}{\sqrt{k}} \] 
(b) \[ \sum_{k=1}^{\infty} \frac{(k!)^3}{(3k)!} \] 
(c) \[ \sum_{k=1}^{\infty} \left( \frac{k}{k+1} \right)^{k^2} \]

2. (20 pts.) Find the interval of convergence of

\[ \sum_{k=1}^{\infty} \frac{(-1)^k}{\sqrt{k+2}} (3x + 2)^k \]

3. (30 pts.) Find the second order Taylor approximation for \(-\log(2-x)\) at 1. Estimate the absolute error on \([1/2, 3/2]\).

4. (20 pts.) Find the first four nontrivial terms of the Maclaurin series for the following functions:

(a) \[ f(x) = \frac{x^9}{(2-x)^2} \]
(b) \[ f(x) = x^4 (x - 1) e^{x^3} \]

Extra credit (5 pts.): What would they be for \(e^{x^3+1}\)?

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