Math 31 – Workshop #24

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1. Determine whether the following series converge absolutely, converge conditionally, or diverge.

(a) $\displaystyle\sum_{n=2}^{\infty}(-1)^n\frac{\sqrt{n}+1}{n^2-1}$

(b) $\displaystyle\sum_{n=3}^{\infty}\frac{(-1)^n\ln n}{n^2}$

(c) $\displaystyle\sum_{n=2}^{\infty}\frac{(-1)^n}{n+\ln n}$

(d) $\displaystyle\sum_{n=2}^{\infty}\frac{(-n)^n}{2^n}$

(e) $\displaystyle\sum_{n=2}^{\infty}\frac{(-1)^n}{n\sqrt[3]{\ln n}}$

(f) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{2^n+3^n}{n!+2^n}$

(g) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{\sqrt{n^2+3}}{\sqrt[3]{n^5+2n+1}}$

(h) $\displaystyle\sum_{n=1}^{\infty}(-1)^n\frac{n+2^n}{2^n\sqrt{n^2+2^n}}$

2. Let $p(x)=a_0+a_1x+a_2x^2+a_3x^3$ represent a cubic polynomial that we choose in order to closely approximate $f(x)=\sqrt{x+4}$. Suppose we do this by requiring that $p(0)=f(0)$, $p'(0)=f'(0)$, $p''(0)=f''(0)$, and $p'''(0)=f'''(0)$.

   (a) What must a_0, a_1, a_2, a_3 equal?

   (b) Now that you've found the polynomial $p(x)$, graph it and $f(x)$ on the same screen of your calculator to see how closely p approximates f. On what interval would you say p is a a good approximation of f?