Wednesday, March 20

Clicker Questions

Clicker Question 1

What about here? . . . what about here?

Suppose the power series $\sum_{n=0}^{\infty} c_n(x-3)^n$ converges when $x=-2$ and diverges when $x=-5$. Of the values $x=-6$, $x=-4$, $x=1$, $x=4$, $x=7$, $x=9$, $x=12$, where can we be sure that the series converges?

A. at $x=-4$, $x=1$, and $x=4$

B. at $x=-4$, $x=1$, $x=4$, $x=7$, and $x=9$

C. only at $x=1$

D. at $x=1$, $x=4$, and $x=7$

E. none of the above

Close enough to 3

The series converges at $x=-2$, so the radius of convergence is at least $|(-2)-3|=5$. The series diverges at $x=-5$, so the radius of convergence is at most $|(-5)-3|=8$. . . .

Clicker Question 2

Power series representation

Find a power series that represents $\frac{x^5}{x^2+3}$ on the interval $(-\sqrt{3}, \sqrt{3})$.

A. $\sum_{n=0}^{\infty} \frac{(-1)^n}{3^{n+1}} x^{2n+5}$

B. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(\sqrt{3})^{n+1}} x^{n}$

C. $\sum_{n=0}^{\infty} \frac{(-1)^{2n+5}}{3^{2n+6}} x^{n}$

D. $\sum_{n=0}^{\infty} \frac{(-1)^n}{(\sqrt{3})^{n+1}} x^{5n}$

E. none of the above

Using the previous example

$$\frac{1}{x+3} = \sum_{n=0}^{\infty} \frac{(-1)^n}{3^{n+1}} x^n \quad (|x| < 3)$$

$$\frac{1}{x^2+3} = \sum_{n=0}^{\infty} \frac{(-1)^n}{3^{n+1}} (x^2)^n \quad (|x^2| < 3)$$

$$\frac{x^5}{x^2+3} = \sum_{n=0}^{\infty} \frac{(-1)^n}{3^{n+1}} (x^2)^n x^5 \quad (|x| < \sqrt{3})$$