Monday, March 4

Clicker Questions

Clicker Question 1

Partial sums that simplify

By finding a formula for s_n, the nth partial sum of the series

$$\sum_{i=1}^{\infty} \left(2^{3/i} - 2^{3/(i+1)}\right),$$

calculate the value that the series converges to.

A. 7

B. 8

C. 0

D. -1

E. none of the above

A "telescoping" sum

$$s_n = \left(2^{3/1} - 2^{3/2}\right) + \left(2^{3/2} - 2^{3/3}\right) + \cdots$$
$$+ \left(2^{3/(n-1)} - 2^{3/n}\right) + \left(2^{3/n} - 2^{3/(n+1)}\right)$$
$$= 2^{3/1} - 2^{3/(n+1)}.$$ So

$$\sum_{i=1}^{\infty} \left(2^{3/i} - 2^{3/(i+1)}\right) = \lim_{n\to\infty} \left(2^{3/1} - 2^{3/(n+1)}\right)$$
$$= 8 - 2^0 = 7.$$

Clicker Question 2

Dividing a complicated series into simpler ones

Using previous examples from this lecture, calculate

$$\sum_{i=1}^{\infty}\left(\frac{3}{7}\left(2^{3/i}-2^{3/(i+1)}\right)-\frac{4}{i^2+8i+15}\right).$$

A. -6

B. -2

C. 2.1

D. 6.1

E. none of the above

Series laws in action

$$\sum_{i=1}^{\infty}\left(\frac{3}{7}\left(2^{3/i}-2^{3/(i+1)}\right)-\frac{4}{i^2+8i+15}\right)$$

$$=\frac{3}{7}\sum_{i=1}^{\infty}\left(2^{3/i}-2^{3/(i+1)}\right)$$

$$-\frac{4}{10}\sum_{i=1}^{\infty}\frac{10}{i^2+8i+15}$$

$$=\frac{3}{7}\cdot 7-\frac{4}{10}\cdot\frac{9}{4}=3-0.9.$$