Friday, October 10, 2008
10:49 AM

I will check HW during the quiz!!!!

1. Compute the 20th partial sum of the geometric series 16 + 12 + 9 + …

$\sum_{i=1}^{n} a_i = a_1\left(\frac{1-r^n}{1-r}\right)$ $\quad a_1=16 \quad r=3/4 \quad n=20$

$S = 16\left(\frac{1-(3/4)^{20}}{1-3/4}\right)$ $\quad$ Lawie: $(\frac{3}{4})^{20} \approx 0$

$\approx 16\left(\frac{1-0}{1-3/4}\right) = 16\left(\frac{1}{1-3/4}\right) = 16\left(\frac{1}{1/4}\right) = 64$

(Actual Value = 63.7981)

50th PS: A little larger → closer to 64
Brandon $(3/4)^{50}$ so closer to 0 than $(3/4)^{20}$

As $n \to \infty$, $16\left(\frac{1-(3/4)^n}{1-3/4}\right) \to 16\left(\frac{1}{1-3/4}\right) = 64$

$\sum_{i=1}^{\infty} a_i = \lim_{n\to\infty} \sum_{i=1}^{n} a_i$ The infinite sum is the limit of the partial sums

For a geometric sequence,

$\sum_{i=1}^{n} a_i = a_1\left(\frac{1-r^n}{1-r}\right)$ and $\sum_{i=1}^{\infty} a_i = a_1\left(\frac{1}{1-r}\right)$ if $-1 < r < 1$

2. Compute

$\sum_{i=1}^{\infty}\left(\frac{4}{3^{2(i-1)}}\right)$ $\quad \frac{4/9}{4} = \frac{1}{9}$

$4 + \frac{4}{9} + \frac{4}{81} + \cdots$ $\quad \frac{4/81}{4/9} = \frac{1}{9}$

$a_1 = 4$ $\quad S = 4\left(\frac{1}{1-\frac{1}{9}}\right)$

Diverges

$\sum_{i=1}^{\infty} 3(1.05)^{i-1}$ $\quad ar^{i-1}$

$a_1 = 3$
$r = 1.05$

$3\left(\frac{1}{1-r}\right) =$

$a_1 = 4$ $r = 1/4$ $S = 4\left(\frac{1}{1-\frac{1}{4}}\right) = \frac{4}{3/4} = 9/2$

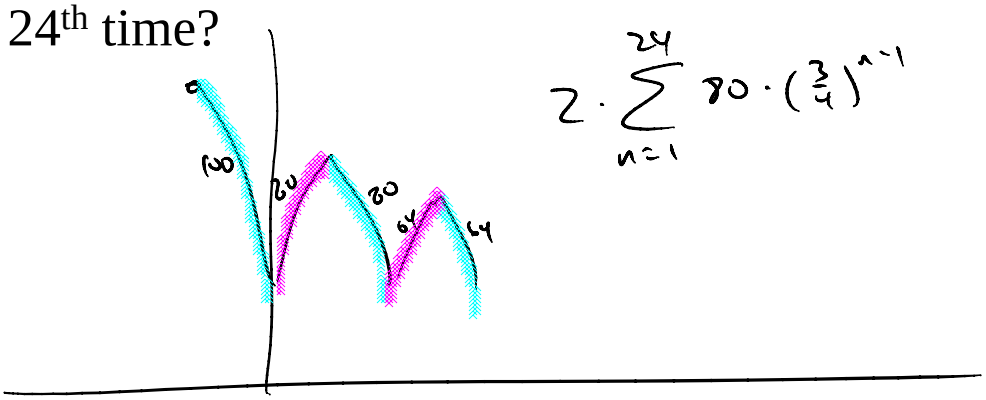
$3\left(\frac{1}{1-1.05}\right) = \frac{3}{-.05} = -60$

3. Compute $1 - \frac{1}{2} + \frac{1}{4} - 1/8 + \ldots$

$a_1 = 1 \quad r = -1/2$

$\frac{1}{1-(-1/2)} = \frac{1}{3/2} = \frac{2}{3}$

4. A ball is dropped from a height of 100 feet. Every bounce is 0.8 times the height of the previous bounce (or drop). How far does it travel before it bounces for the 24th time?



$2 \cdot \sum_{n=1}^{24} 80 \cdot \left(\frac{3}{4}\right)^{n-1}$

$.\overline{9} = 1$

$.\overline{9} = .9 + .09 + .009 + .0009 + \ldots$

$a_1 = .9 \quad r = .1 \quad S = \frac{.9}{1-.1} = \frac{.9}{.9} = 1$

$.\overline{81} = .81 + .0081 + .000081$