Partial Review

1.
a) $a_n = (n+2)^2$, $n \in \mathbb{N}$ or n starts with 1

b) $a_n = -1.4(n-1)+45.3$
$= -1.4n + 46.7$

2. let h_n = height (cm) of the n^{th} bounce

a) $h_n = 64\left(\frac{3}{4}\right)^{n-1}$

b) $S_7 = \sum_{n=1}^{7} h_n = 64\left(\frac{1-\left(\frac{3}{4}\right)^7}{1-\frac{3}{4}}\right)$

$= \frac{14197}{64} \approx 221.828$

The total of all the heights attained by the ball in the first 7 bounces is 221.8 cm.

3. a) $S_4 = \sum_{n=1}^{4} 3\left(-\frac{2}{3}\right)^{n-1} = 3\left(\frac{1-\left(-\frac{2}{3}\right)^4}{1+\frac{2}{3}}\right)$

$= \frac{13}{9}$

(3) b) $\sum_{k=3}^{15} \frac{k^2}{k+1} \approx 105.547$

c) $\sum_{i=4}^{16} \frac{4+2i}{3} = \frac{13(4+12)}{2} = 13(8) = 104$

d) $\sum_{j=0}^{\infty} 4\left(-\frac{2}{5}\right)^j = \frac{4}{1+\frac{2}{5}} = \frac{4}{\frac{7}{5}} = \frac{20}{7}$

e) $\sum_{n=0}^{\infty} 2^n$ diverges since $|r| = 2 > 1$

(4) a) $\frac{2}{27+1} + \frac{6}{64+2} + \frac{24}{125+3} + \frac{120}{216+4} + \ldots = \sum_{i=1}^{\infty} \frac{(i+1)!}{(i+2)^3 + i}$

b) $\frac{1}{2} - \frac{3}{4} + \frac{9}{8} - \frac{27}{16} + \ldots + \frac{6561}{512} = \sum_{i=1}^{9} \frac{1}{2}\left(-\frac{3}{2}\right)^{i-1}$