R. Bruner
Math 2020, Winter 2007, Quiz 9
21 March 2007

Compute, showing your work,

$$(1) \quad \lim_{n\to\infty} \frac{1-n}{2+n} \qquad (2) \quad \lim_{n\to\infty} \frac{n+n^2}{2n+n^3}$$

(1) $$\lim_{n\to\infty} \frac{1-n}{2+n} = \lim_{n\to\infty} \frac{\frac{1}{n}-1}{\frac{2}{n}+1} = \frac{0-1}{0+1} = -1$$

(2) $$\lim_{n\to\infty} \frac{n+n^2}{2n+n^3} = \lim_{n\to\infty} \frac{\frac{n}{n^3}+\frac{n^2}{n^3}}{\frac{2n}{n^3}+\frac{n^3}{n^3}}$$

$$= \lim_{n\to\infty} \frac{\frac{1}{n^2}+\frac{1}{n}}{\frac{2}{n^2}+1} = \frac{0+0}{0+1} = 0$$

Solutions using L'Hopital's rule:

(1) $$\lim_{n\to\infty} \frac{1-n}{2+n} \overset{\infty/\infty}{=} \lim_{n\to\infty} \frac{-1}{+1} = -1$$

(2) $$\lim_{n\to\infty} \frac{n+n^2}{2n+n^3} \overset{\infty/\infty}{=} \lim_{n\to\infty} \frac{1+2n}{2+3n^2} \overset{\infty/\infty}{=} \lim_{n\to\infty} \frac{2}{6n} = 0$$