(8) Guess the limit of $\left\langle \frac{(-1)^n}{n} \right\rangle_{n=1}^{\infty}$.

$\left\langle -\frac{1}{1}, \frac{1}{2}, -\frac{1}{3}, \frac{1}{4}, -\frac{1}{5}, \frac{1}{6}, \dots \right\rangle \to \boxed{0}$

(9) Guess the limit of $\left\langle 2^{-n} \right\rangle_{n=0}^{\infty}$.

$\left\langle 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}, \frac{1}{16}, \frac{1}{32}, \dots \right\rangle \to \boxed{0}$

(10) Guess the limit of $\left\langle \frac{3n+2}{2n+1} \right\rangle_{n=3}^{\infty}$.

$\left\langle \frac{11}{7}, \frac{14}{9}, \frac{14}{11}, \frac{20}{13}, \frac{23}{15}, \frac{26}{17}, \frac{29}{19}, \frac{32}{21}, \dots, \frac{302}{201}, \dots, \frac{3002}{2001}, \dots \right\rangle$

$\to \boxed{\frac{3}{2}}$

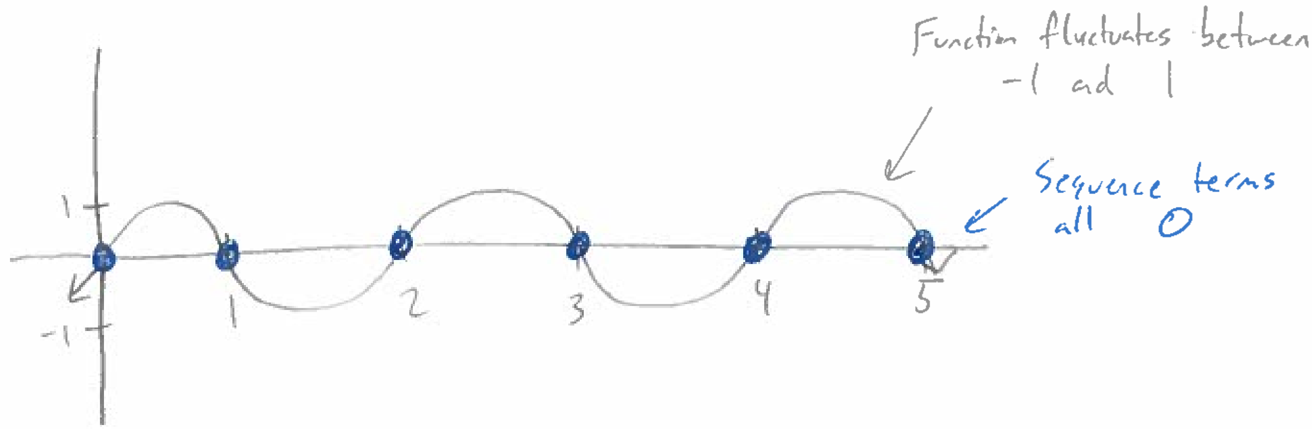
(11) Does $\left\langle \frac{n!}{n^2+1} \right\rangle_{n=0}^{\infty}$ appear to converge or diverge?

$\left\langle \frac{1}{1}, \frac{1}{2}, \frac{2}{5}, \frac{6}{10}, \frac{24}{17}, \frac{120}{26}, \frac{720}{37}, \dots \right\rangle$ appears to $\boxed{\text{diverge}}$.

(12) Does $\left\langle \sin\left(\frac{\pi n}{3}\right) \right\rangle_{n=0}^{\infty}$ appear to converge or diverge?

$\left\langle 0, \frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}, 0, -\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}, 0, \frac{\sqrt{3}}{2}, \frac{\sqrt{3}}{2}, \dots \right\rangle$ appears to $\boxed{\text{diverge}}$.

(13) Sketch a picture showing why $\lim_{n\to\infty} \sin(\pi n) = 0$, but $\lim_{x\to\infty} \sin(\pi x)$ DNE.



(14) What are the first five terms of $\left\langle \frac{n+2}{3+n^2} \right\rangle_{n=1}^{\infty}$?

$$\left\langle \frac{3}{4}, \frac{4}{7}, \frac{5}{12}, \frac{6}{19}, \frac{7}{28}, \ldots \right\rangle$$

$$= \boxed{\left\langle \frac{3}{4}, \frac{4}{7}, \frac{5}{12}, \frac{6}{19}, \frac{1}{4}, \ldots \right\rangle}$$

(15) What are the first five terms of $\langle w_n \rangle_{n=0}^{\infty}$ defined recursively by $w_0 = 1$, $w_1 = 2$, $w_{n+2} = 2w_n + w_{n+1}$?

$w_0 = 1$

$w_1 = 2$

$w_2 = w_{0+2} = 2w_0 + w_1 = 2(1) + 2 = 4$

$w_3 = w_{1+2} = 2w_1 + w_2 = 2(2) + 4 = 8$

$w_4 = w_{2+2} = 2w_2 + w_3 = 2(4) + 8 = 16$

$$\boxed{\langle 1, 2, 4, 8, 16, \ldots \rangle}$$

(16) Does $\left\langle 1, \frac{3}{4}, \frac{5}{8}, \frac{9}{16}, \frac{17}{32}, \ldots \right\rangle$ appear to converge or diverge?

$$= \left\langle 1, \frac{2}{4}+\frac{1}{4}, \frac{4}{8}+\frac{1}{8}, \frac{8}{16}+\frac{1}{16}, \frac{16}{32}+\frac{1}{32}, \ldots \right\rangle$$

$$= \left\langle 1, \frac{1}{2}+\frac{1}{4}, \frac{1}{2}+\frac{1}{8}, \frac{1}{2}+\frac{1}{16}, \frac{1}{2}+\frac{1}{32}, \ldots \right\rangle$$

appears to $\boxed{\text{converge to } \frac{1}{2}}$.