202 §10.1 #s 6, 10, 18, 30, 36, 46, 92

#s 1–6 Find a_1 thru a_4

(6) $a_n = \frac{2^n - 1}{2^n}$

$a_1 = \frac{1}{2}$

$a_2 = \frac{3}{4}$

$a_3 = \frac{7}{8}$

$a_4 = \frac{15}{16}$

#s 7–12 Find $a_1 - a_{10}$

(10) $a_1 = -2$, $a_{n+1} = \frac{n a_n}{n+1}$

$a_2 = \frac{2(-2)}{2+1} = \frac{-4}{3} = a_2$

$a_3 = \frac{3\left(-\frac{4}{3}\right)}{3+1} = -\frac{4}{4} = -1 = a_3$

$a_4 = \frac{4(-1)}{4+1} = -\frac{4}{5} = a_4$ PATTERN IS CLEAR?

$a_5 = \frac{5\left(-\frac{4}{5}\right)}{5+1} = -\frac{4}{6} = -\frac{2}{3} = a_5$

$a_6 = \frac{6\left(-\frac{4}{6}\right)}{6+1} = \frac{-4}{7} = a_6$

$a_7 = -\frac{4}{8} = -\frac{1}{2}$

$a_8 = -\frac{4}{9}$

$a_9 = -\frac{4}{10} = -\frac{2}{5}$

$a_{10} = -\frac{4}{11}$

202 § 10.1 #s 18, 30, 36, 46, 92

#s 13-26 Find n^{th} terms Formula

18. $-\frac{3}{2}, -\frac{1}{6}, \frac{1}{12}, \frac{3}{20}, \frac{5}{30}$

Increasing by 2 ∴ Numerator

So involves a $2n$ in it

$n=1$ ∴ numerator $= -3$

$2(1) + x = -3$

$x = -5$

Numerator ∴ $2n-5$

$2 = 2\cdot 1$

$6 = 3\cdot 2$

$12 = 3\cdot 4$

$20 = 4\cdot 5$

$30 = 5\cdot 6$

$n(n+1) = $ Denom.

$$\boxed{a_n = \frac{2n-5}{n(n+1)}}$$

#s 27-90 convergence? Find Δ' if convergent

30. $$a_n = \frac{2n+1}{1-3\sqrt{n}} = \frac{n\left(2+\frac{1}{n}\right)}{\sqrt{n}\left(\frac{1}{\sqrt{n}}-3\right)} = \left(\frac{2+\frac{1}{n}}{\frac{1}{\sqrt{n}}-3}\right)\sqrt{n}$$

$\underrightarrow{n \to \infty}\ \infty$ $\boxed{\text{Diverges}}$

36. $a_n = (-1)^n\left(1-\frac{1}{n}\right)$ also diverges, jumping back and forth between something just below $+1$ to something just above -1.

(46) ~~Use T20~~

$$a_n = \frac{\sin^2 n}{2^n}$$

$$-\frac{1}{2^n} \leq \frac{|\sin^2 n|}{2^n} = \frac{\sin^2 n}{2^n} \leq \frac{1}{2^n} \quad \forall n$$

since $2^n \xrightarrow{n\to\infty} \infty$, we have

$$-\frac{1}{2^n} \xrightarrow{n\to\infty} 0 = \lim_{n\to\infty} \frac{\sin^2 n}{2^n} = 0 = \lim_{n\to\infty} \frac{1}{2^n}$$

(92) Find the limit, ~~assuming~~

Assume it HAS a limit.

$$a_1 = -1, \quad a_{n+1} = \frac{a_n+6}{a_n+2}$$

If I assume it has a limit, then

$$\lim_{n\to\infty} a_n = \lim_{n\to\infty} \frac{a_n+6}{a_n+2} \longleftrightarrow$$

$$L = \frac{L+6}{L+2} \quad \text{Solve for } L$$

$$L^2+2L-L-6=0$$

$$L^2+L-6 = (L+3)(L-2) = 0$$

$$\Rightarrow \cancel{L=-3} \text{ OR } \boxed{L=2.}$$