BB

Calc BC §9.1 Pg 480 # 11-20, 35, 39, 48

(11) $1 + \frac{2}{3} + \left(\frac{2}{3}\right)^2 + \dots$

$a = 1 \quad r = \frac{2}{3}$

Converges to $\frac{1}{1-\frac{2}{3}} = 3$

(12) $1 - 2 + 3 - \dots - (-1)^n(n+1)$

$S_1 = 1$

$S_2 = -1$ Diverges

$S_3 = 2$

$S_4 = -2$

(13) $\sum_{n=0}^{\infty} \left(\frac{5}{4}\right)\left(\frac{2}{3}\right)^n$

$a = \frac{5}{4} \quad r = \frac{2}{3}$

Converges to $\frac{\frac{5}{4}}{1-\frac{2}{3}} = \frac{15}{4}$

(14) $\sum_{n=0}^{\infty} \left(\frac{2}{3}\right)\left(\frac{5}{4}\right)^n$

$a = \frac{2}{3} \quad r = \frac{5}{4}$

diverges

(15) $\sum_{n=0}^{\infty} \cos(n\pi)$

$S_1 = 1$

$S_2 = 1 + -1 = 0$ Diverges

$S_3 = 1 - 1 + 1 = 1$

(16) $3 - 0.3 + .03 - \dots + 3(-0.1)^n \dots$

$a = 3 \quad r = \left(-\frac{1}{10}\right)$

converges to $\frac{3}{1-\left(\frac{1}{10}\right)} = \frac{3}{\frac{11}{10}} = \frac{30}{11}$

Partial sums look like..

3, 2.7, 2.73, 2.727, 2.7273,

(17) $\sum_{n=0}^{\infty} \sin^n\left(\frac{\pi}{4} + n\pi\right)$ ⇒ look @ terms

$1 - \frac{1}{\sqrt{2}} + \left(\frac{1}{\sqrt{2}}\right)^2 - \left(\frac{1}{\sqrt{2}}\right)^3 + \dots = \sum_{n=0}^{\infty}\left(\frac{-1}{\sqrt{2}}\right)^n$

$a = 1 \quad r = -\frac{1}{\sqrt{2}}$ converges

to $\frac{1}{1+\frac{1}{\sqrt{2}}} = \frac{1}{\frac{\sqrt{2}+1}{\sqrt{2}}} = \frac{\sqrt{2}}{\sqrt{2}+1}$

(18) $\frac{1}{2} + \frac{2}{3} + \frac{3}{4} + \dots + \frac{n}{n+1} + \dots$

Diverges

(19) $\sum_{n=1}^{\infty} \left(\frac{\pi}{e}\right)^n$

$a = \frac{\pi}{e}$ $r = \frac{\pi}{e}$

Converges to

$\left|\frac{\frac{\pi}{e}}{1-\frac{\pi}{e}}\right| = \frac{\frac{\pi}{e}}{\left|\frac{\pi - e}{e}\right|}$

$= \frac{\pi}{\pi - e}$

(20) $\sum_{n=0}^{\infty} \frac{5^n}{6^{n+1}} = \frac{1}{6} + \frac{5}{36} + \dots$

$= \sum_{n=0}^{\infty} \frac{1}{6} \cdot \frac{5^n}{6^n}$

$a = \frac{1}{6}$ $r = \frac{5}{6}$

Converges to

$\left|\frac{\frac{1}{6}}{1-\frac{5}{6}}\right| = 1$

(35) a) $\sum_{n=1}^{\infty} 2n = 2 + 4 + 6 + 8$

$S = 2, 6, 12, \dots$ goes to ∞

b) $\sum_{n=0}^{\infty} (-1)^n = 1 - 1 + 1 - 1$ oscillates

c) $\sum_{n=1}^{\infty} (-1)^n (2n) = -2 + 4 - 6 + 8 - 10 + 12 - \dots$

$-2, 2, -4, 4, -6, 6, -8, 8, \dots$

(39) $S = \frac{2}{1-r}$

$S(1-r) = 2$

$S - Sr = 2$

$r = \frac{S-2}{S}$

$\sum_{n=1}^{\infty} 2\left(\frac{3}{5}\right)^{n-1}$

b) $S = \frac{\frac{13}{2}}{1-r}$

$S - Sr = \frac{13}{2}$

$-Sr = \frac{3}{2}$

$r = -\frac{3}{10}$

$\sum_{n=1}^{\infty} \frac{13}{2}\left(-\frac{3}{10}\right)^{n-1}$

(40) $4 + 2 \cdot \sum_{n=1}^{\infty} 2.4\left(\frac{3}{5}\right)^{n-1}$

$4 + 2\left(\frac{2.4}{1-\frac{3}{5}}\right) = 16$ m