# 9.2 HW

Friday, December 27, 2019 9:27 AM

Packet Page 601 #3-15odd, 16, 19, 25, 29, 42, 48, 52, 75, 91, 92

3. $S_1 = 3$ $S_2 = 3 - 9/2 = -1.5$ $S_3 = 3 - 9/2 + 27/4 = 5.25$ $S_4 = 5.25 - 81/8 = -4.875$ $S_5 = 10.3125$

5. $\sum_{n=1}^{\infty} \frac{3}{2^{n-1}}$ $S_1 = 3$ $S_2 = 4.5$ $S_3 = 5.25$ $S_4 = 5.625$ $S_5 = 5.8125$

7. $\sum_{n=0}^{\infty} \left(\frac{7}{6}\right)^n$ Geometric $|r| > 1$ $\therefore$ Diverges

9. $\sum_{n=1}^{\infty} \frac{n}{n+1}$ $\lim_{n\to\infty} \frac{n}{n+1} = 1$ ($n^{th}$ Term test) Diverges $\neq 0$

11. $\sum_{n=1}^{\infty} \frac{n^2}{n^2+1}$ $\lim_{n\to\infty} \frac{n^2}{n^2+1} = 1 \neq 0$ Diverges

13. $\sum_{n=1}^{\infty} \frac{2^n+1}{2^{n+1}} = \sum_{n=1}^{\infty} \frac{2^n+1}{2^n \cdot 2}$ $\lim_{n\to\infty} \frac{2^n+1}{2 \cdot 2^n} = \frac{1}{2}$ $\neq 0$ Diverges

15. $\sum_{n=0}^{\infty} (5/6)^n$ Geometric $0 < |r| < 1$ Converges

16. $\sum_{n=1}^{\infty} 2\left(-\frac{1}{2}\right)^n$ Converges $0 < |r| < 1$

19. $\sum_{n=1}^{\infty} \frac{1}{n(n+1)}$ (telescoping)

$1 = A(n+1) + Bn$ $\sum_{n=1}^{\infty} \frac{1}{n} + \frac{-1}{n+1}$ $\lim_{n\to\infty} 1 + \frac{-1}{n+1} = 1 + 0$

$A = 1$ $B = -1$

$\boxed{\text{converges to } 1}$

25. $\sum_{n=0}^{\infty} 5\left(\frac{2}{3}\right)^n$ $a_0 = 5$ $S_\infty = \frac{5}{1 - 2/3} = \frac{5}{1/3} = \boxed{15}$

29. $8 + 6 + 9/2 + \frac{27}{8} + \ldots$ $\frac{8}{1 - 3/4} = \frac{8}{(1/4)} = \boxed{32}$

$a_1 = 8$ $r = 3/4$

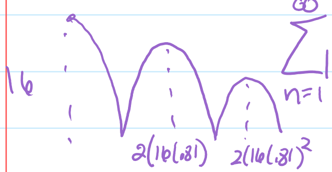
42. $\sum_{n=0}^{\infty} \frac{3^n}{1000}$ $\sum_{n=0}^{\infty} \frac{1}{1000} \cdot 3^n$ Diverging since $r = 3$

42. $\sum_{n=0} \frac{\quad}{1000}$ $\quad \sum_{n=0} \frac{\quad}{1000}$ Diverging since

48. $\sum_{n=0}^{\infty} \frac{3}{5^n} = \sum_{n=0}^{\infty} 3 \cdot \left(\frac{1}{5}\right)^n$ converges $r = 1/5$ $\quad \frac{3}{1 - 1/5} = \frac{3}{(4/5)} = 15/4$

52. $\sum_{n=1}^{\infty} e^{-n} = \sum_{n=1}^{\infty} \left(\frac{1}{e}\right)^n$ converges $0 < \left|\frac{1}{e}\right| < 1$

75. $h = 16$ feet $\quad$ rebounds $0.81h$




$\sum_{n=1}^{\infty} 16 + 2\underbrace{\left(16(.81)^n\right)}_{\to a_1 =}$

$16 + \frac{25.92}{1 - .81} \approx 16 + 136.421 \approx 152.421$ feet

91. $\lim_{n \to \infty} a_n = 0$ then $\sum_{n=1}^{\infty} a_n =$ converges $\quad$ False

92. $\sum_{n=1}^{\infty} a_n = L$ then $\sum_{n=0}^{\infty} a_n = L + a_0$ $\quad$ True