

HW §11.2 Numbers 16,20,24,38,52

16.

$$\sum_{n=1}^{\infty} \frac{-6^{n-1}}{5^{n-1}} = \sum_{n=1}^{\infty} \left(\frac{-6}{5}\right)^{n-1}$$

diverges since  $|-6/5| = 6/5 > 1$ .

20.

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

which converges to

$$\frac{e}{1 - (e/3)} = \frac{3e}{3 - e}$$

since  $e/3 < 1$ .

$$\sum_{n=1}^{\infty} \frac{(n+1)^2}{n(n+2)}$$

diverges, since

$$\lim_{n \rightarrow \infty} \frac{(n+1)^2}{n(n+2)} = 1 \neq 0$$

38.

$$\begin{aligned} 6.\overline{254} &= 6.2 + .054 + .00054 + \dots \\ &= 6.2 + \sum_{n=1}^{\infty} \frac{54}{1000} \left(\frac{1}{100}\right)^{n-1} \\ &= 6.2 + \frac{54/1000}{1 - 1/100} \\ &= \frac{62}{10} + \frac{3}{55} \\ &= \frac{682}{110} + \frac{6}{110} \\ &= \frac{688}{110} = 614/55 \end{aligned}$$

52.

a.

$$H + \sum_{n=1}^{\infty} 2Hr^{n-1} = H + \frac{2H}{1-r}$$

b.

$$\sqrt{\frac{2H}{g}} + \sum_{n=1}^{\infty} 2\sqrt{\frac{2H}{g}r^n} = \sqrt{\frac{2H}{g}} \left[1 + \frac{2\sqrt{r}}{1-\sqrt{r}}\right]$$

c.

$$\sqrt{\frac{2H}{g} \frac{1+k}{1-k}}$$