MRS22-HW#11 (new)

1) *The recursive formula is* $a_{n+1} = a_n \cdot r$*, so we have*

$$\begin{aligned} a_8 &= a_7(r) \\ &= a_6(r^2) \\ &= a_5(r^3) \\ &\vdots \\ &= a_1(r^7) \\ 512 &= 256(r^7) \\ 2 &= r^7 \\ r &= \sqrt[7]{2} \end{aligned}$$

2)

$$\begin{aligned} h_1 &= 18 \\ h_2 &= 16.2 \\ h_3 &= 14.58 \\ h_4 &= 13.122 \end{aligned}$$

3)

$$\begin{aligned} 20(0.9)^n &< 6 \\ n\log(0.9) &< log(6) - \log(20) \\ n &> \frac{\log(6) - \log(20)}{\log(0.9)} \\ n &> 11.42 \end{aligned}$$

So, it takes 12 *bounces for the bouncy ball to rebound under* 6 *feet.*

4) $h_n = 20(0.9)^n$ *for* $n \geq 0$

5) $h_{n+1} = 3.5 + h_n$ *with* $h_0 = 5$

6) $h_n = 5 + 3.5n$

7) $h_{n+1} = 0.9\, h_n$ *with* $h_0 = 20$

8) $a_n = 12 + 4.2n \text{ for } n \geq 0$

9) $a_{n+1} = 3a_n \text{ with } a_0 = \frac{1}{5}$

10)

$$20(0.9)^n < y$$
$$n\log(0.9) < \log(y) - \log(20)$$
$$n > \frac{\log(y) - \log(20)}{\log(0.9)}$$

Rounding this up to the next integer with the ceiling function, it takes $\left\lceil \frac{\log(y) - \log(20)}{\log(0.9)} \right\rceil$ *bounces for the bouncy ball to rebound under* y *feet.*