Problem 2

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Use the fact that the present value of a perpetuity paying $X per period starting in one year is X/r, where r is the riskless rate of return, to determine the present value of annual payments of $X accruing for 20 years, starting one year from now. Hint: Think of it as a perpetuity less the appropriately discounted value of a perpetuity starting 20 years from now.

$X/r - \sum_{t=1}^{20} X/(1+r)^t$

$V_0 = \frac{X}{r} - \left(\frac{X}{r}\right)\left(\frac{1}{(1+r)^{20}}\right) = \frac{X}{r} \cdot \left(1 - \frac{1}{(1+r)^{20}}\right)$