Question #120
Key: E

$$X_{2002} = 1.05 \times X_{2001}$$

so: $$F\left(\frac{x_{2002}}{1.05}\right) = 1 - \left[\frac{2000}{(x_{2002}/1.05 + 2000)}\right]^2$$
$$= 1 - \left[\frac{2100}{x_{2002} + 2100}\right]^2$$

This is just another Pareto distribution with $\alpha = 2, \theta = 2100.$
$\mathrm{E}[X_{2002}] = 2100.$

and
$$\mathrm{E}[X_{2002} \wedge 3000] = \left(\frac{2100}{1}\right) \times \left[1 - \left(\frac{2100}{(3000 + 2100)}\right)\right]$$
$$= 2100 \times \left[\frac{3000}{5100}\right] = 1235$$

So the fraction of the losses expected to be covered by the reinsurance is
$$\frac{2100 - 1235}{2100} = 0.412.$$

The total expected losses have increased to 10,500,000, so
$$C_{2002} = 1.1 \times 0.412 \times 10{,}500{,}000 = 4{,}758{,}600$$

And $$\frac{C_{2002}}{C_{2001}} = \frac{4{,}758{,}600}{4{,}400{,}000} = 1.08$$