From the value of σ deduce the value of the series $\sum_{p=0}^{\infty} \frac{1}{(2p+1)^4}$.

7 (Worth 25 pts) Write down the Fourier series of the periodic function, with period 2,

$$f(x) = \begin{cases} 1+x & \text{if } -1 < x < \frac{1}{2} \\ 0 & \text{if } \frac{1}{2} < x < 1 \end{cases} .$$

From the value of the Fourier series at $x = \frac{1}{2}$ derive the value of the series $\sum_{p=0}^{\infty} \frac{1}{(2p+1)^2}$.