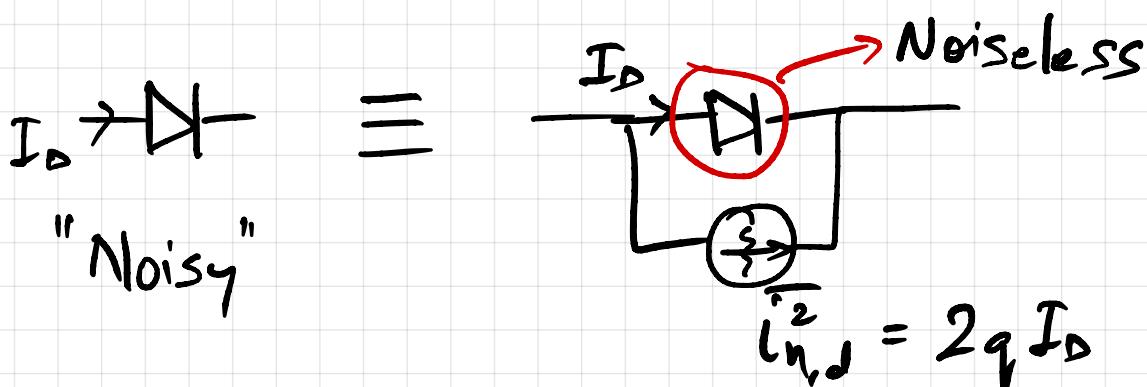
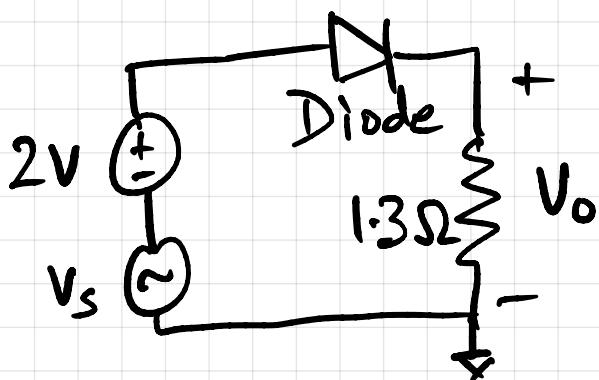


①



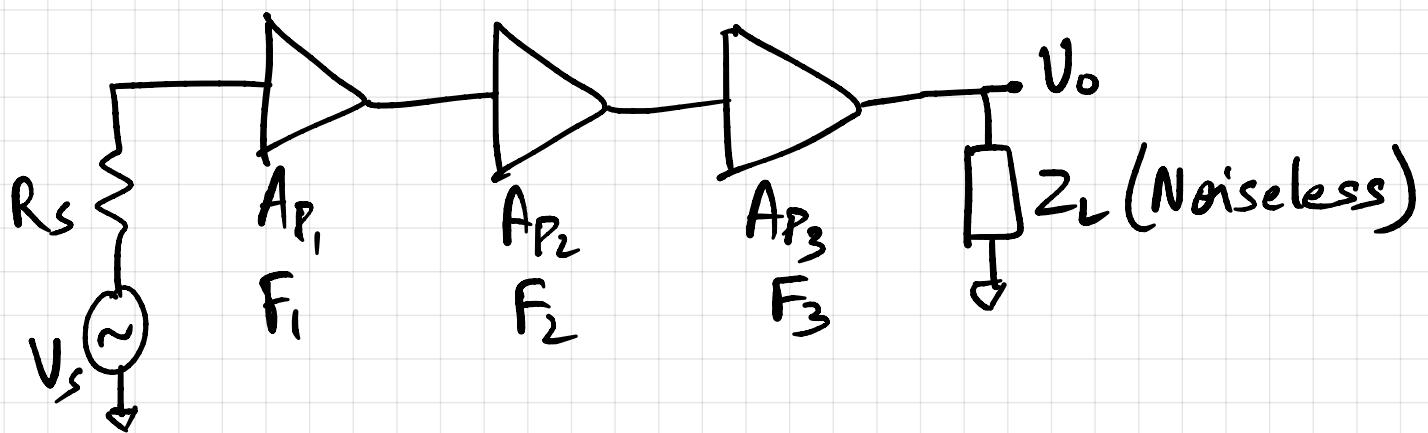
Shot noise in a forward-biased diode is modelled as shown above. (q : electronic charge).

$$(V_{Knee} = 0.7V)$$



- (a) Find total V_o . (V_s is a small signal source)
- (b) Find noise PSD in output voltage V_o .
- (c) Replace the diode with a physical resistor so that small signal gain $\left[\frac{V_o}{V_s}\right]$ remains same. Then repeat part (b).

②



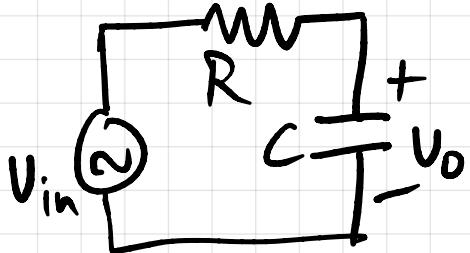
A_{P_K} = Available Power Gain of K^{th} stage amplifier

F_K = Noise factor of K^{th} stage amplifier

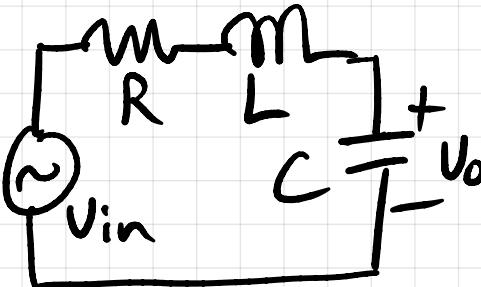
Three amplifiers are connected in cascade as shown above. All the stages are matched at both the ports.

Find noise factor (F) of entire chain.

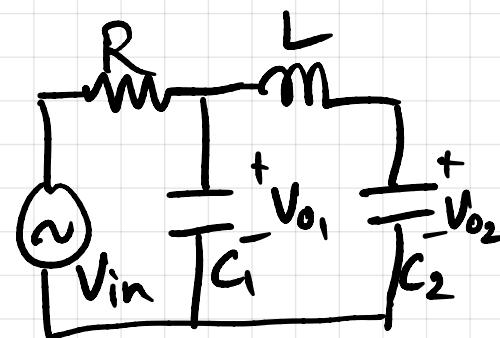
③ Find total output noise power in the following circuits.



(a)

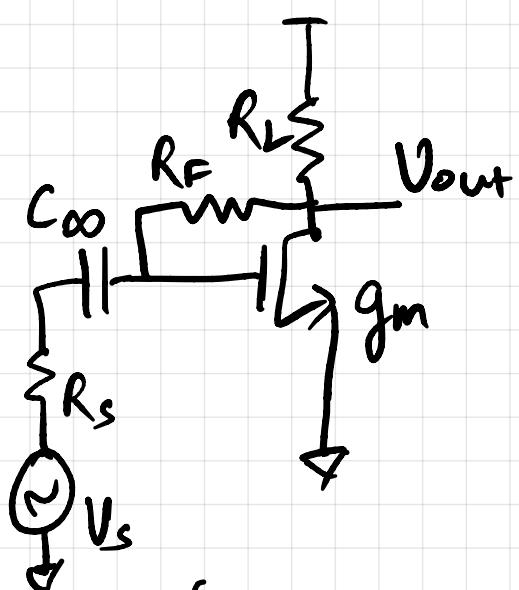


(b)

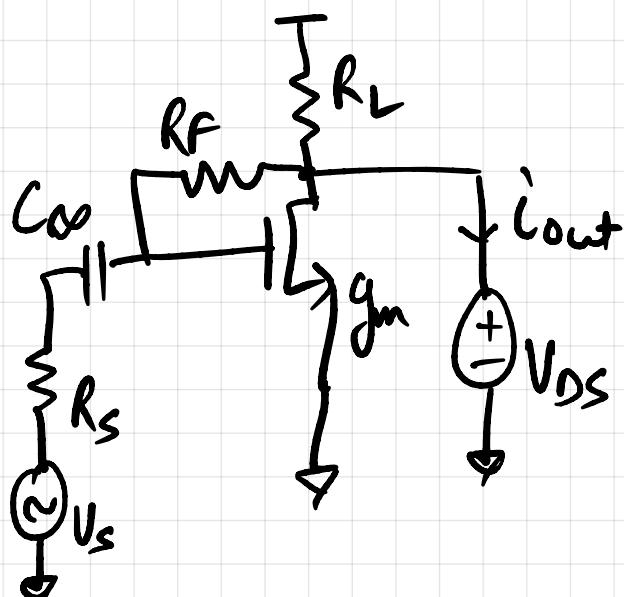


(c)

④ Find NF of following circuits.



(a)



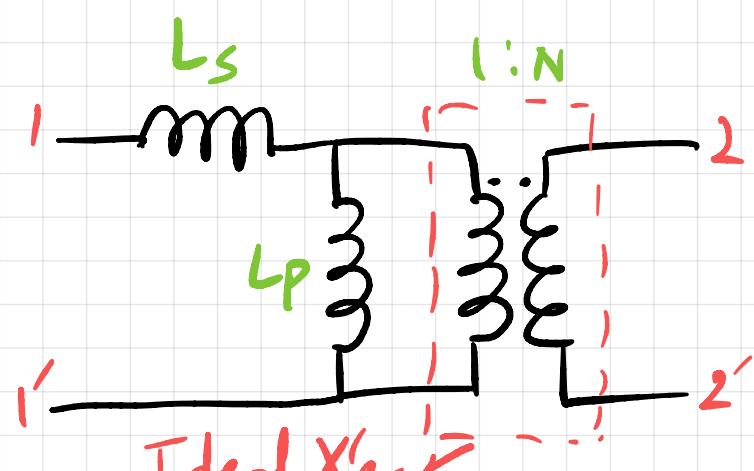
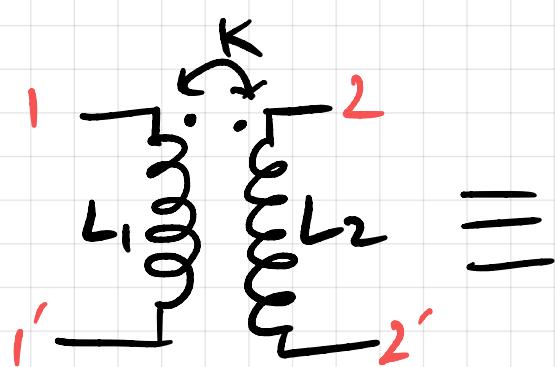
(b)

Assume NMOS is biased in saturation and there are no capacitive parasitics.

Ignore gate resistance.

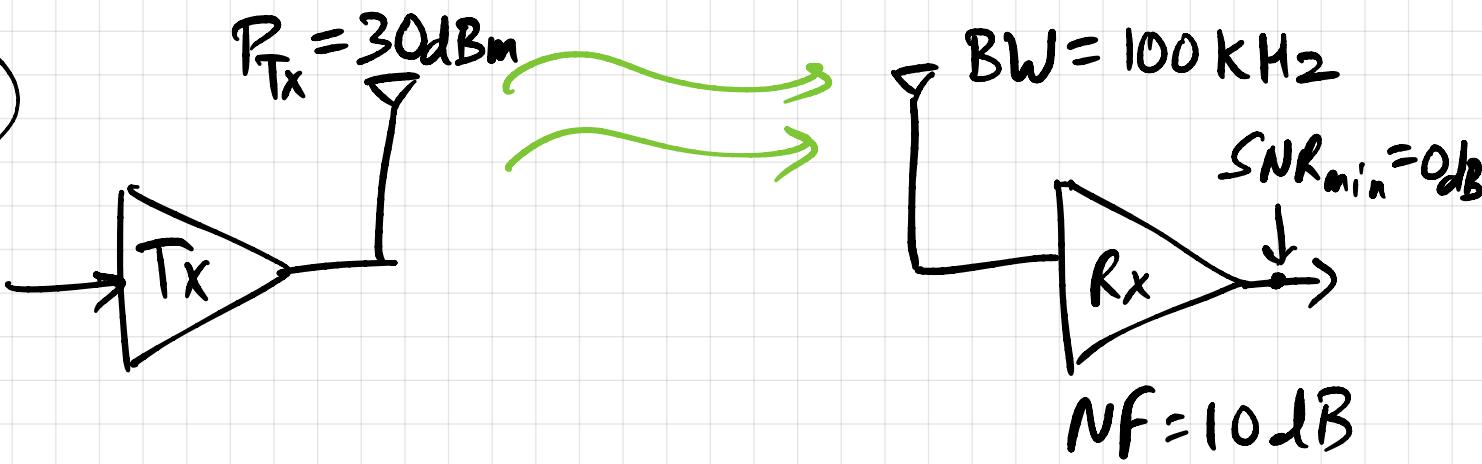
$$r_{ds} = \infty$$

⑤



Find L_s , L_p and N in terms of L_1 , L_2 and K
s.t. the two models are equivalent.

⑥



Find the maximum attenuation allowed in the atmosphere so that the receiver can operate satisfactorily.