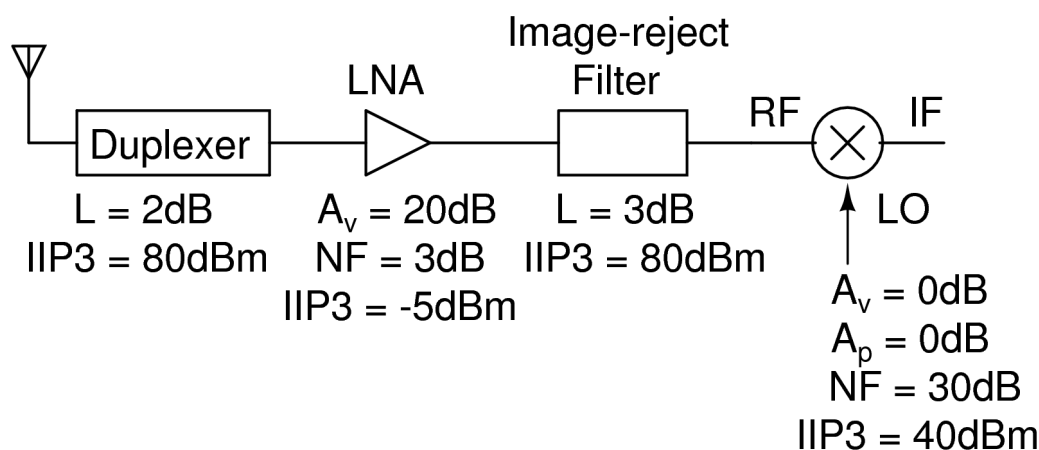


**EE6240 Homework 4: Due Wednesday 12/10/2011**

1) This problem reviews analysis of cascaded systems and receiver front-ends. For the Superheterodyne receiver front-end shown below, assume that signal bandwidth is 200kHz and minimum acceptable SNR is 15dB. Assume  $R_{in} = R_{out} = 50\Omega$  for all stages. Calculate the following {Ignore contributions from IF stages and beyond}:

a) overall NF; b) overall IIP3; c) Sensitivity; d) SFDR



2) This problem is the reverse of problem 1. It requires you to **design** a direct-conversion receiver front-end (shown below) to have the following performance:

Minimum Gain = 35dB; Sensitivity = -85dBm; SFDR = 50dB

The signal bandwidth and minimum required SNR are 10MHz and 10dB respectively. Assume  $R_{in} = R_{out} = 50\Omega$  for all stages. Determine the following:

a) Overall NF and IIP3 of the receiver

b) Decide the Gain, NF and IIP3 of the LNA and Mixer {there are several solutions; choose carefully so that the circuit performances are practical}

