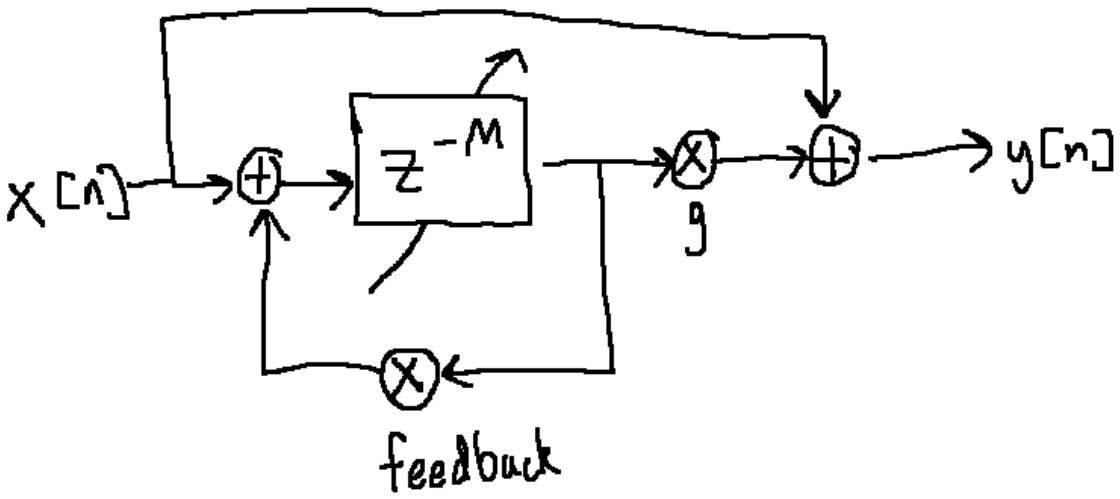
**DST Homework #2: DUE FEBRUARY 16th at 11:59PM**

Please submit your assignment to Brightspace as a .zip file containing the following:

- a jupyter notebook containing your solution to the programming question
- the original “hw2_audio.wav” file
- your solutions to the theory section as a photo, pdf or txt file

**Programming:**

Implement a flanger and apply it to “hw2_audio.wav”:




- Implement the delay line as a fractional delay line using your interpolation method of choice (linear interpolation will be the simplest)

- Use a low frequency sine wave to modulate the length of the delay line

- Choose values for **g**, **feedback** and the sine wave’s **frequency** and amplitude that you think sound good (you won’t be graded on your taste in flanger effects

**Theory:**

Consider the following transfer function:

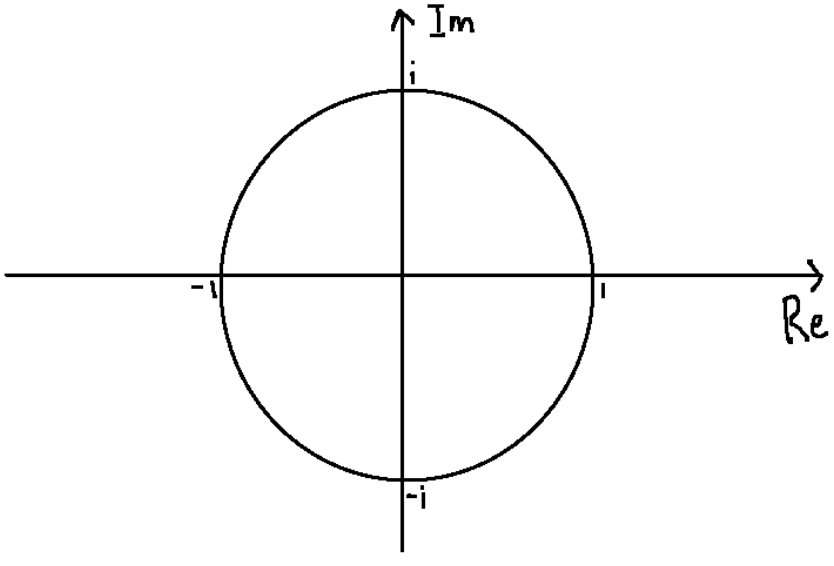
$$H(z) = \frac{b_0 + b_1 z^{-1} + b_2 z^{-2}}{1 + a_1 z^{-1} + a_2 z^{-2}}$$

$b_0$ = 0.21112927559799435
$b_1$ = -0.4222585511959887
$b_2$ = 0.21112927559799435
$a_1$ = 0.5235283165533257
$a_2$ = 0.368045418945303

1. Factor the numerator and denominator into products of 1st order polynomials in the following form. Use the quadratic formula and note that the roots ($q_1$, $p_2$, etc) may be complex!

$$H(z) = g\frac{(1 - q_1 z^{-1})(1 - q_2 z^{-1})}{(1 - p_1 z^{-1})(1 - p_2 z^{-1})}$$

2. Plot the poles (x) and zeros (o) on the complex plane



3. Draw an approximate plot of the filter’s frequency response by analyzing the location of the poles and zeros.