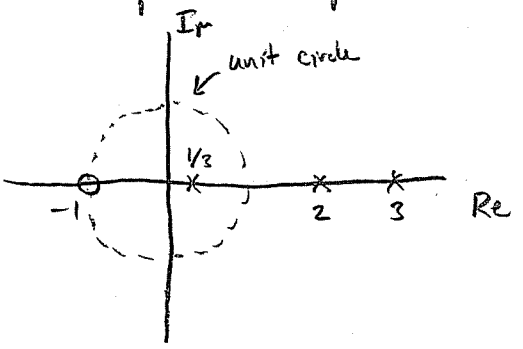
Consider the z-transform $X(z)$ whose pole-zero plot is shown below



(a) Determine the ROC if it is known that the DTFT exists, also, determine whether the corresponding time-domain sequence is right-sided, left-sided, or two-sided

(b) How many possible two-sided sequences have this pole-zero plot?

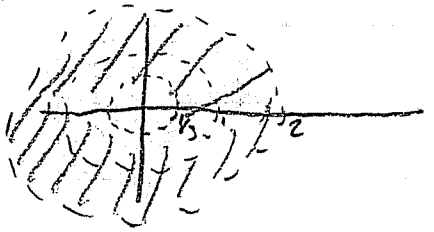
(c) Is it possible for this pole-zero plot to be associated with a time-domain sequence that is both causal and stable?

If so, give the appropriate ROC.

(a) If the DTFT exists, then the ROC includes the unit circle

Since the ROC is a doughnut,

$x[n]$ is **two-sided**



(b) There is one more two-sided sequence that has this pole zero plot (that makes a total of two). This second ROC is a doughnut starting with a radius of 2 and going to an radius of 3

(c) Causal means ROC is outside outermost pole

Stable means ROC includes unit circle

Both cannot be satisfied at once

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