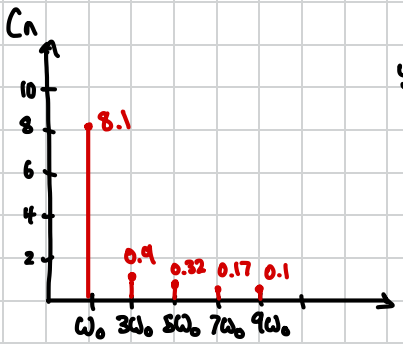
FREQUENCY DOMAIN



$$y = 10 \sum_{\substack{n=1 \\ \text{odd}}}^{\infty} \underbrace{\frac{4}{\pi^2 n^2}}_{C_n} \cos(n\omega_0 t + \underbrace{0}_{\phi_n})$$

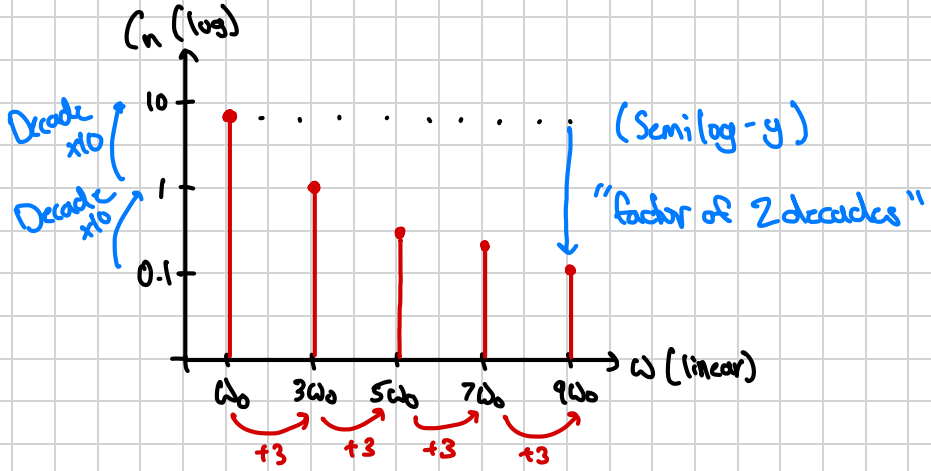
DYNAMIC RANGE

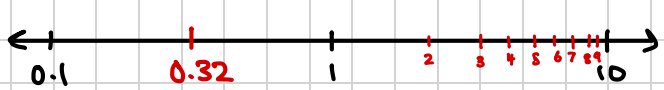
$$= \frac{\text{Biggest \# in set}}{\text{Smallest \# in set}}$$

$$= \frac{8.1}{0.1} = 81$$

LOG PLOT

Linear: Spacing between tick marks is a constant added to the prior one
Log: Spacing between tick marks is a constant multiplied to the prior mark





Minor tick % between major ticks $= \log_{10}\left(\frac{\#}{\text{lower major tick}}\right)$

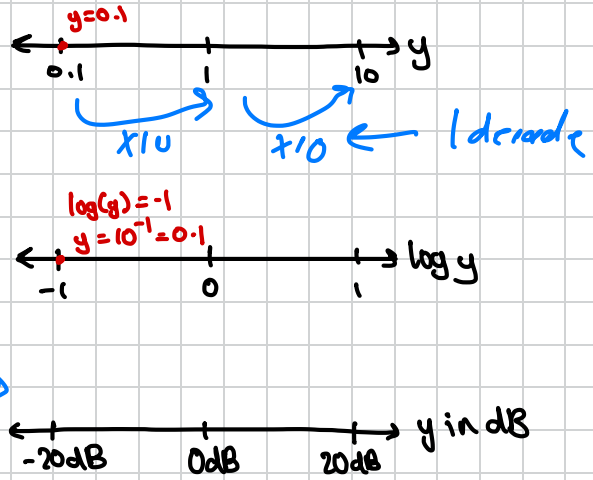
$\log_{10}\left(\frac{0.32}{0.1}\right) = 0.505$

50.5%

1) Plot y itself on a line with log-spaced ticks

2) Plot log(y) on a line with linear-spaced ticks

3) Decibels dB # in dB = 20 log(#) (Voltage, current)



$20 \times \log(100\ V)$?? $\log(V)$??

log can only apply to dimensionless QTYs

- plot gain, dimensionless

$20 \times \log\left(\frac{100\ V}{1\ V}\right) = 40\ dB\ V$

$20 \times \log\left(\frac{100\ V}{1\ \mu V}\right) = 160\ dB\ \mu V$

Monomials: $y(x) = ax^n$ linear on log-log

Exponentials: $y(x) = ac^x$ linear on semilog-y

Logarithms: $y(x) = a\log(x)$ linear on semilog-x

$\cos(2\pi f_1 x) = \cos(2\pi f_2 x)$