Exam 2 Review
Office Hours:
Thursday 1pm - 3pm

\[ V_0 = \frac{8\pi}{58\pi} \text{ V} \]

\[ I = \frac{1V}{58\pi} \]

\[ P = V_0 I = \frac{8\pi}{(58\pi)^2} \text{ W} \]

Velleman Function generator
\[ I = \frac{1V - V_+}{50\Omega} = 0mA \]

\[ I = \frac{1V}{8n} = 0.125A \]

\[ P = V_0 \cdot I = 0.125W \]
$dB$ (decibel)

$dB = 10 \log P$

$V_+ = V_-$
\[ G_1 = -\frac{R_2}{R_1} \]

\[ G_2 = -\frac{R_4}{R_3} \]
G of original circuit = \( G_1 \cdot G_2 \)

\[
G = \frac{V_0}{V_{in}} = \frac{V_0'}{V_{in}} \cdot \frac{V_0}{V_0'} = \frac{R_4 R_2}{R_3 R_1}
\]

\[
G_{\text{noninverting}} = \left( 1 + \frac{R_F}{R_1} \right)
\]
Superposition

- Turn on and off sources
  DV source $\rightarrow$ short circuit
  OA source $\rightarrow$ open circuit
Thevenin and Norton Equivalent Circuits

a. Source transformation

\[
V_i \quad \Rightarrow \quad \frac{V_i}{R_1} + R_1
\]
b. Req of circuit w/o \( R_L \)

\[ V \]

\[ R_1 \]

\[ R_2 \]

\[ R_L \]

Turn off all sources

\[ R_1 \]

\[ R_2 \] \( \approx \) \( R_{eq} = R_1 || R_2 = R_{th} \)

Then calculate \( V_{oc} \) (Thevenin circuit) \( I_{sc} \) (Norton circuit)
C. Calculate (or measure)

\[ V_{oc} = V_{Th} \quad \text{and} \quad I_{sc} = I_{n} \]

\[ R_{Th} = \frac{V_{oc}}{I_{sc}} \]

\[ V_{oc} = \frac{R_2}{R_2 + R_1} V_1 \]

\[ I_{sc} = \frac{V_1}{R_1} \]

\[ R_{Th} = \frac{V_{oc}}{I_{sc}} = \frac{R_1 R_2}{R_2 + R_1} = R_1 || R_2 \]
\[ I_W = \frac{V_1}{R_1} \]
Max Power Transfer

max power transferred to $R_L$ occurs when $R_L = R_{Th}$

$\text{max power transferred to } R_L \text{ occurs when } R_L = R_{Th}$
Op Amps (Ideal)
- no current flows into the input terminals of op amp
- $V_o = V_-$
  enough current will be supplied at the output terminal to allow this

Non-ideal work this way as long as $V^- \leq V_o \leq V^+$
\[ i = \frac{3V - 3V}{R_1} = 0 \text{mA} \]

\[ u_+ - u_- = 0 \text{V} \]
\[ i = 0 \text{mA} \]

\[ V_A = 2V \]
\[ V_B = 5V \]
\[ i = \frac{3V}{R_1} = \frac{V_B - V_A}{R_1} \]