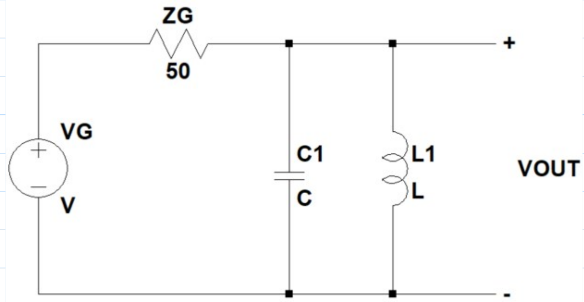
$C := 47 \cdot 10^{-12}\ F$

$Z_G := 50\ \Omega$

$f_s := 200\ MHz$

$\omega := 2\ \pi \cdot f_s$



Bestem L

$$\frac{1}{2\ \pi \cdot \sqrt{47\ \mathrm{pF} \cdot L}} = 200\ MHz \xrightarrow{solve, L} \frac{1}{7520000 \cdot \pi^2 \cdot MHz^2 \cdot pF} = \left(13.474 \cdot 10^{-9}\right)\ H$$

$L := 13.47\ 10^{-9}\ H$

Find H(f) = V_{OUT}/V_G og tegn |H(f)|

$Z_C := \dfrac{1}{1j \cdot \omega \cdot 47 \cdot 10^{-12}\ F} = -16.931i\ \Omega$

$Z_L := 1j \cdot \omega \cdot L = 16.927i\ \Omega$

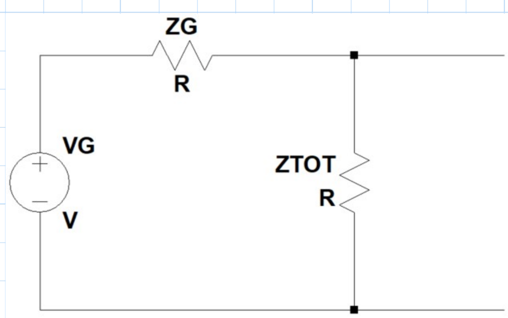
$X_C(s) := \dfrac{1}{s \cdot C}$

$X_L(s) := s \cdot L$

$Z_{tot} := \dfrac{Z_C \cdot Z_L}{Z_C + Z_L}$

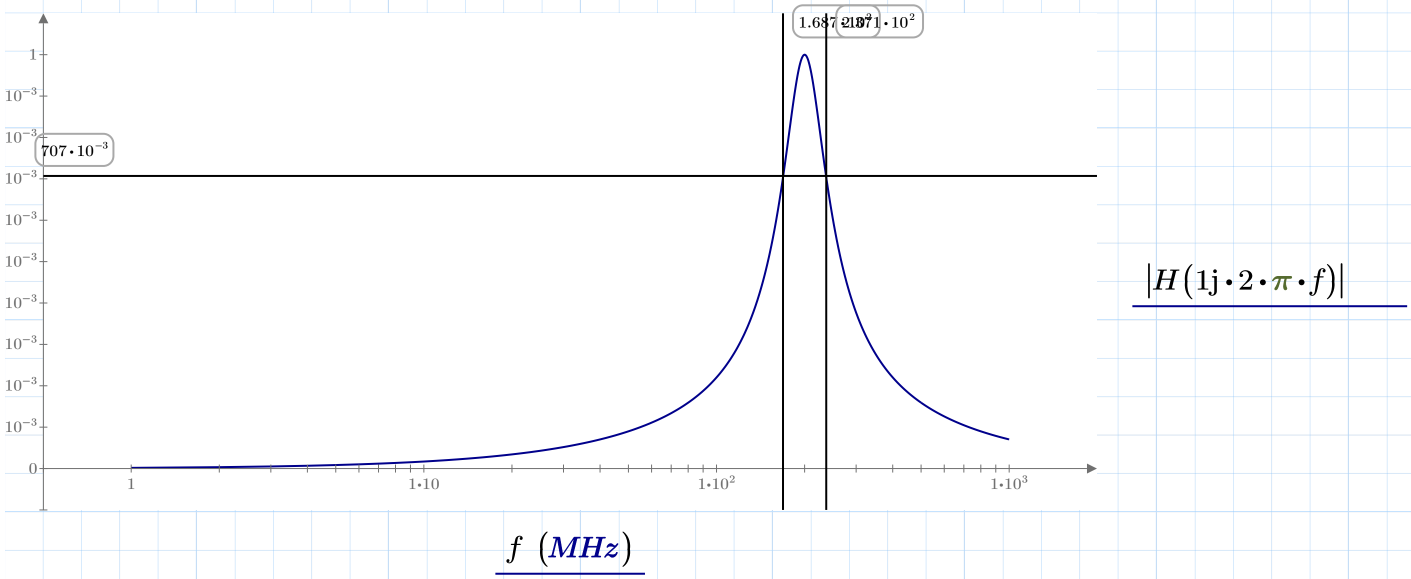
$X_{tot}(s) := \dfrac{X_C(s) \cdot X_L(s)}{X_C(s) + X_L(s)}$

$H(\omega) := \dfrac{Z_{tot}}{Z_G + Z_{tot}}$



$H(s) := \dfrac{X_{tot}(s)}{Z_G + X_{tot}(s)}$

$f := 1\ MHz, 2\ MHz .. 1000\ MHz$



Find f_{3dB} (2 stk)

$\mathbf{clear}\left(L, C, H\right)$

$C := 47 \cdot 10^{-12}$ $\quad L := 13.5 \cdot 10^{-9}$ $\quad \omega := 2\ \pi \cdot f_s$

$$H(f) = \frac{V_{OUT}}{V_G} = \frac{Z_{TOT}}{Z_G + Z_{TOT}} = \frac{1j \cdot \omega \cdot L \cdot \dfrac{1}{1 - \omega^2 \cdot L \cdot C}}{1j \cdot \omega \cdot L \cdot \dfrac{1}{1 - \omega^2 \cdot L \cdot C} + Z_G} = \frac{1j \cdot \omega \cdot L}{-1j \cdot \omega \cdot L + Z_G \cdot \left(1 - C \cdot L \cdot \omega^2\right)}$$

$$|H(f)| = \frac{\omega \cdot L}{\sqrt{(\omega \cdot L)^2 + \left(50\ \left(1 - \omega^2\ L \cdot C\right)\right)^2}}$$

$$H_{ABS}(f) := \frac{2 \cdot \pi \cdot f \cdot L}{\sqrt{(2 \cdot \pi \cdot f \cdot L)^2 + \left(50\ \left(1 - (2 \cdot \pi \cdot f)^2 \cdot L \cdot C\right)\right)^2}}$$

$$H_{ABS}(x) = \frac{1}{\sqrt{2}} \xrightarrow{solve, x} \begin{bmatrix} 1.6879052211712147302 \cdot 10^8 \\ 2.3651602981580033393 \cdot 10^8 \end{bmatrix}$$

$f1_{3dB} := 1.688 \cdot 10^8\ Hz = 168.8\ MHz$

$f2_{3dB} := 2.365 \cdot 10^8\ Hz = 236.5\ MHz$

Beregn Q

$B := f2_{3dB} - f1_{3dB} = 67.7\ MHz$

$Q := \frac{f_s}{B} = 2.95$