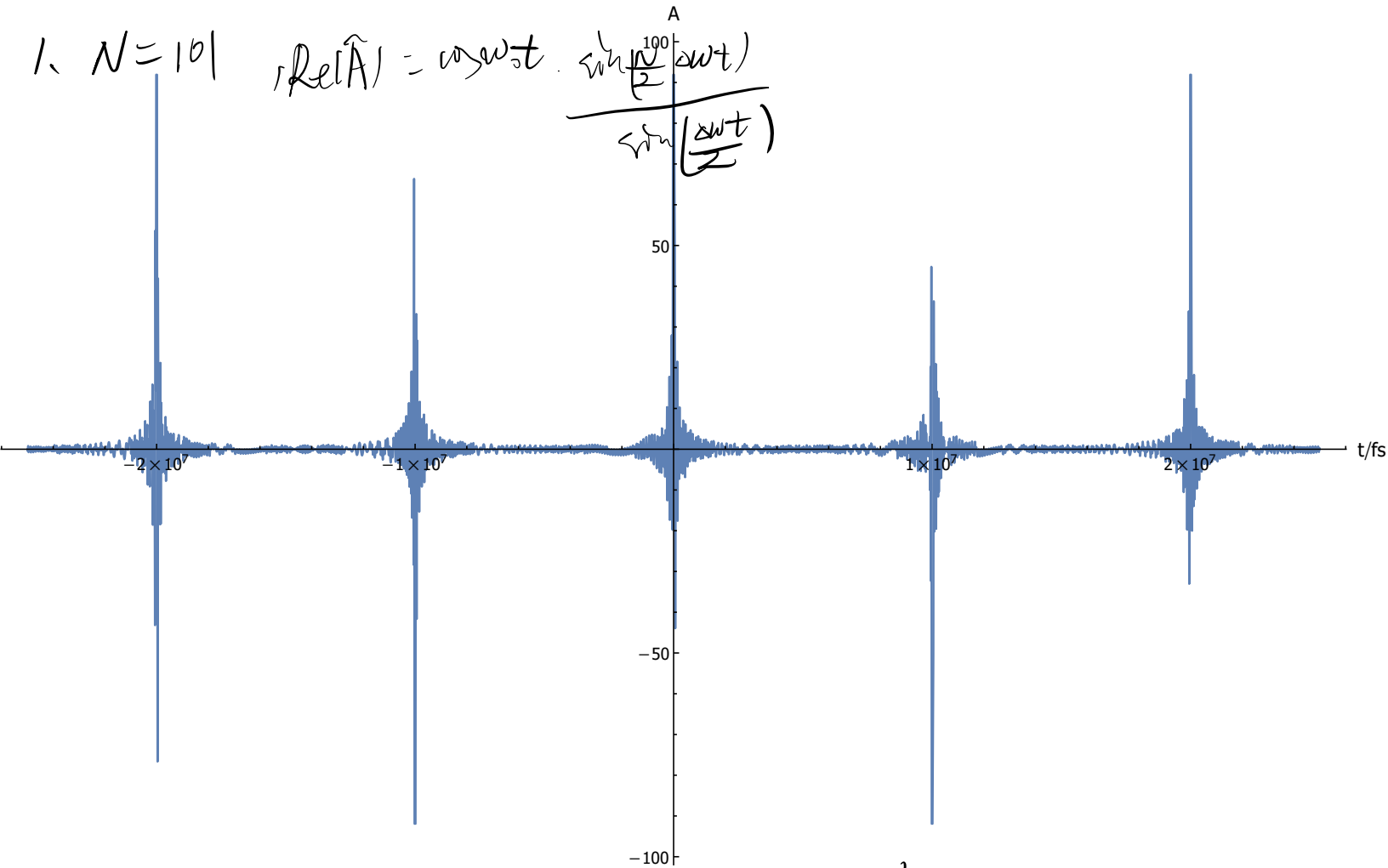
1. $N=101$ $\mathrm{Re}[\hat{A}] = \cos\omega t \cdot \frac{\sin\left(\frac{N}{2}\omega t\right)}{\sin\left(\frac{\omega t}{2}\right)}$



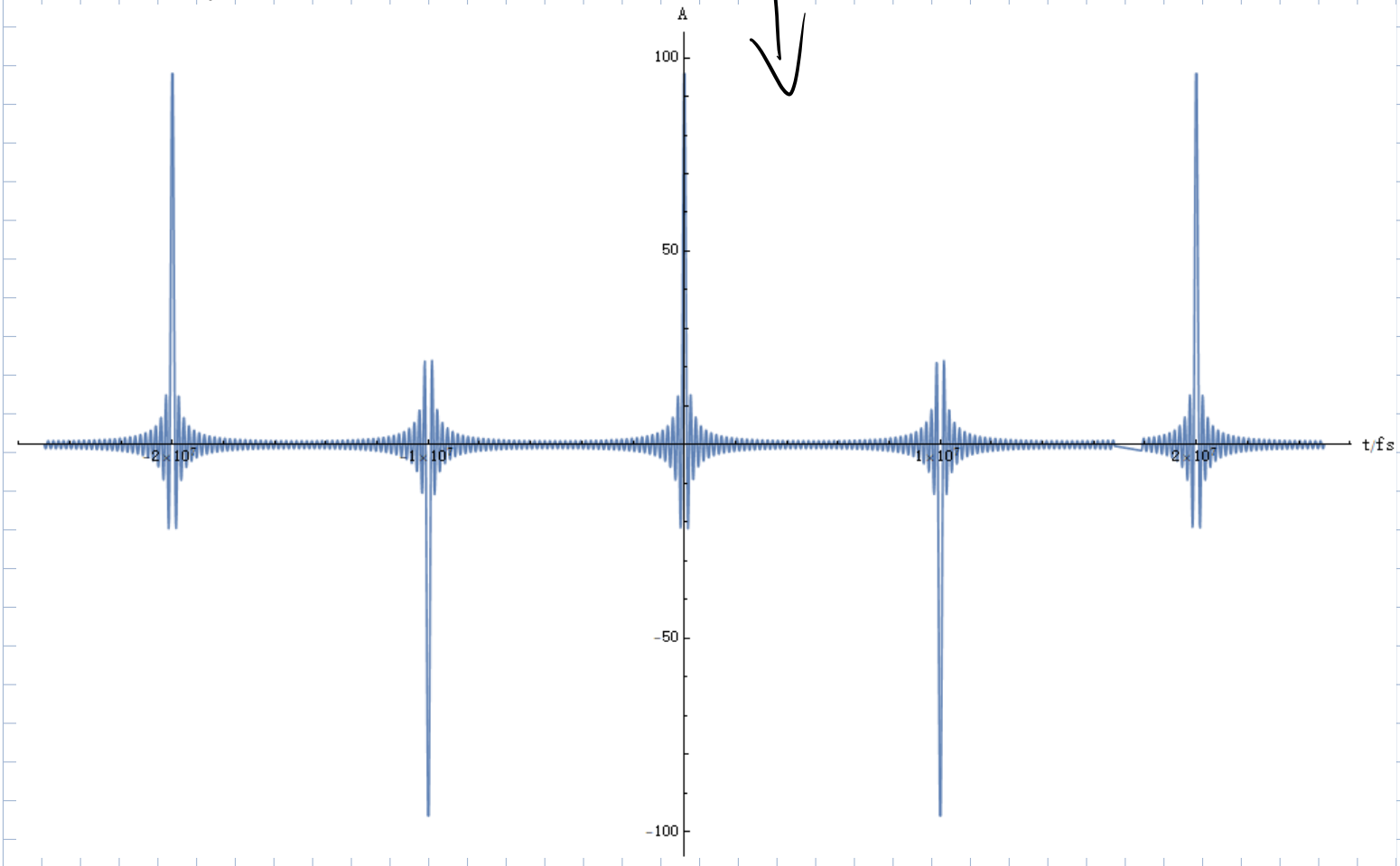
$$\hat{A} = \sum e^{j\omega_0 t - jn\cdot\delta\omega t} = e^{-j\omega_0 t}\cdot\frac{\sin\left(\frac{N}{2}\delta\omega t\right)}{\sin\left(\frac{\delta\omega}{2}t\right)}$$

$$\Rightarrow Re(\hat{A}) = \cos\omega_0 t\cdot\frac{\sin\left(\frac{N}{2}\delta\omega t\right)}{\sin\left(\frac{\delta\omega}{2}t\right)}$$

$N=101$, $-25\,ns \le t \le 25\,ns$, the figure is above

For $A(t) = \dfrac{\sin\left(\frac{N}{2}\delta\omega t\right)}{\sin\left(\frac{\delta\omega}{2}t\right)}$, $N=101$, $-25\,ns \le t \le 25\,ns$

the figure is below:



2. $I \sim \dfrac{\sin^2\left(\frac{N}{2}\delta\omega t\right)}{\sin^2\left(\frac{1}{2}\delta\omega t\right)} = \sum_n C_n e^{jn\omega t}$

$$\Rightarrow I(\omega) = \int\sum\sum e^{j(\omega t - n_1\delta\omega t - n_2\delta\omega t)}\,dt = \int\sum\sum e^{j(\omega - n_1\delta\omega - n_2\delta\omega)t}\,dt$$

require $\omega = (n_1+n_2)\delta\omega$. $\dfrac{\delta\omega}{2\pi} = 0.1\,GHz$

So $\omega = 0 \Rightarrow I(\omega) = 2\pi\cdot 101$; $\omega = 0.1 \Rightarrow I(\omega) = 2\pi\cdot 100$ - - - - -

⇒ the figure is like: (Ignore the coefficient 2π)