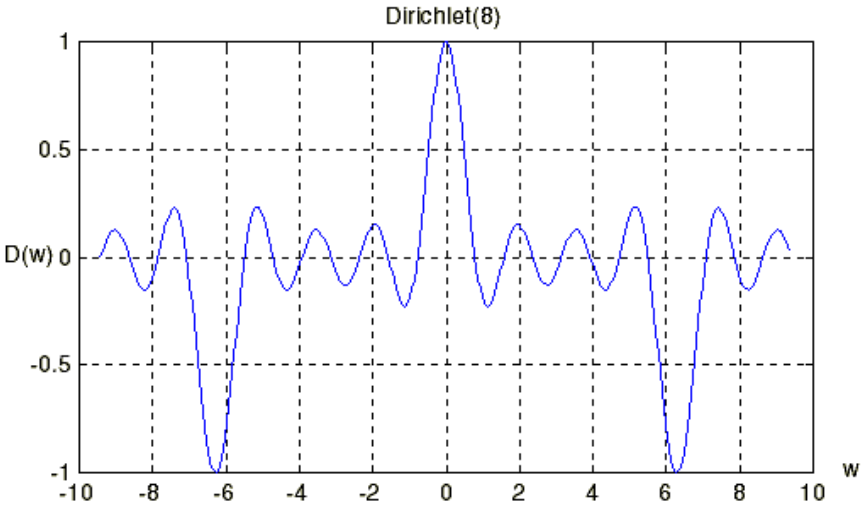
Opg 6.10

Dirichlets funktion.

$$D_L(\hat{\omega}) = \frac{\sin(L\hat{\omega}/2)}{L\sin(\hat{\omega}/2)} \qquad L = 8$$

Mathlab-plotting:

```
» w=-3*pi:0.05:3*pi;
» d=diric(w,8);
» plot(w,d)
»
```



$$D_8(\hat{\omega}) = \frac{\sin(8\hat{\omega}/2)}{8\sin(\hat{\omega}/2)} = 0 \quad \Leftrightarrow \quad \sin(8\hat{\omega}/2) = 0 \quad \wedge \quad \sin(\hat{\omega}/2) \neq 0$$

$$\Leftrightarrow \quad 4\hat{\omega} = p\pi \quad \wedge \quad \hat{\omega}/2 \neq q\pi$$

$$\underline{\hat{\omega} = p\frac{\pi}{4}} \qquad \text{hvor} \qquad p \in Z \setminus \{0,\pm 8,\pm 16,\pm 24,...\}$$

b) $\sin(8\hat{\omega}/2)$ er periodisk med $\frac{\pi}{2}$. $\sin(\hat{\omega}/2)$ er periodisk med $4\pi = 8\frac{\pi}{2}$.

Dvs. $D_8(\hat{\omega})$ er periodisk med $\underline{4\pi}$.

c) Maximum fås for $\hat{\omega} = 0 \quad \Rightarrow \quad \underline{D_{8\max}(\hat{\omega}) = 1}$