Opg 4.4

$$x(t) = 7\sin(11\pi t) = 7\cos(\frac{\pi}{2} - 11\pi t) = 7\cos(11\pi t - \frac{\pi}{2}) = 7\cos(2\pi \cdot 5.5t - \frac{\pi}{2})$$

$$x[n] = x(nT_s) = 7\cos(2\pi 5.5T_s n - \frac{\pi}{2}) = A\cos(2\pi \hat{f}_0 n + \phi)$$

I alle tilfælde haves: $\underline{A = 7}$ og $\underline{\phi = \frac{\pi}{2}}$.

Desuden gælder: $\hat{f}_0 = f_0 T_s = \frac{f_0}{f_s}$,

endelig er: $f_0 = 5.5[Hz]$.

Krav til korrekt sampling: $2f_0 = 11 < f_s$

a) $f_s = 10 < 2f_0$ $\Rightarrow$ undersampling

$$\hat{f}_0 = f_0 T_s = \frac{f_0}{f_s} = \frac{5.5}{10} = \underline{0.55}$$

b) $f_s = 5 < 2f_0$ $\Rightarrow$ undersampling

$$\hat{f}_0 = f_0 T_s = \frac{f_0}{f_s} = \frac{5.5}{5} = \underline{1.1}$$

c) $f_s = 15 > 2f_0$ $\Rightarrow$ oversampling

$$\hat{f}_0 = f_0 T_s = \frac{f_0}{f_s} = \frac{5.5}{15} = \underline{0.367}$$