Digitale Bildverarbeitung - Lösung Blatt 3 (Fourier-Transf., Splines, DFT)

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1 Aufgabe 1: Fourier-Beziehungen

1.1 1a) Verschiebung im Ortsbereich

$\{f(x-\alpha, y-\beta)\} = \int\int_1^5 f(x-\alpha, y-\beta) \cdot e^{-j2\pi(xu+yv)}$

2 Aufgabe 2: Spline

$$f(x) = \begin{cases} f_1(x) = a_1x^3 + b_1x^2 + c_1x + d_1 \\ f_2(x) = a_2x^3 + b_2x^2 + c_2x + d_2 \\ f_3(x) = 0 \end{cases}$$

$$f'(x) = \begin{cases} f_1'(x) = 3a_1x^2 + 2b_1x + c_1 \\ f_2'(x) = 3a_2x^2 + 2b_2x + c_2 \\ f_3'(x) = 0 \end{cases}$$

$$f''(x) = \begin{cases} f_1''(x) = 6a_1x + 2b_1 \\ f_2''(x) = 6a_2x + 2b_2 \\ f_3''(x) = 0 \end{cases}$$

$$f_1(0) = 1 = a_1 \cdot 0 + b_1 \cdot 0 + c_1 \cdot 0 + d_1 = d_1 = 1$$
$$f_1'(0) = 0 = 3a_1 \cdot 0 + 2b_1 \cdot 0 + c_1 = c_1 = 0$$