BHC Tutorium 29.10.26

Aufgabe fertig machen:

$$Y(s) = \underbrace{\frac{2}{s^2(s+2)}}_{\text{PBZ}} - \frac{4}{s(s+2)} + \frac{1}{s+2}$$

$$\frac{2}{s^2(s+2)} = \frac{A}{s^2} + \frac{B}{s+2} + \frac{C}{s}$$

doppelte Nst.

Nullst. $(0, -2)$

$\Rightarrow A = 1 \quad B = \frac{1}{2} \quad C$?

zuhalten $= \frac{1}{s^2} + \frac{\frac{1}{2}}{s+2} - \frac{C}{s}$

$\Rightarrow$ alle $s = 1$ willkürlich

eingesetzt $\Rightarrow \frac{2}{1^2(1+2)} = \frac{1}{1} + \frac{\frac{1}{2}}{1+2} + \frac{C}{1} \Rightarrow C = -\frac{1}{2}$

$$\frac{2}{3} = 1 + \frac{1}{6} + C \quad =$$

Berechnen Sie das Doppelintegral $f(x,y) = \frac{\sqrt{y}}{\sqrt{1+x^2}}$

auf dem Gebiet $A = \{(x,y) \mid 0 \le x \le \sinh(y),\ 0 \le y \le 1\}$

$$\int_0^1 dy \int_0^{\sinh(y)} \frac{\sqrt{y}}{\sqrt{1+x^2}}\, dx = \int_0^1 \sqrt{y}\, dy \int_0^{\sinh(y)} \frac{1}{\sqrt{1+x^2}}\, dx = \int_0^1 \sqrt{y}\, dy \Big[\operatorname{arsinh}(x) \Big]_0^{\sinh(y)}$$

$$= \int_0^1 \sqrt{y}\, dy \cdot y = \frac{2}{5} y^{\frac{5}{2}} \Big|_0^1 = \frac{2}{5}$$

Bestimmen Sie das Doppelintegral von $f(x,y) = \sin\left(\frac{y}{x}\right)$

auf dem Gebiet $A = \{(x,y) \mid 0 < \overset{②}{x} \le \pi,\ 0 \le \overset{①}{y} \le x^2\}$

$$\int_0^{x^2} dy \int \sin\left(\frac{y}{x}\right) dy = -\cos\left(\frac{y}{x}\right) \cdot x \Big|_0^{x^2} = -\cos\left(\frac{x^2}{x}\right) \cdot x - -\underbrace{\cos(0)}_{1} \cdot x$$

$$= x - x \cdot \cos(x) \Longrightarrow \int_0^{\pi} dx$$

$$\int_0^{\pi} \underset{u}{x} + \underset{v'}{\cos x} = x \cdot \sin x \Big|_0^{\pi} - \int_0^{\pi} \sin x \, dx = \left[\pi \cdot \sin \pi - 0\right] - - \cos \Big|_0^{\pi}$$

$$= 0 - \left(1 - - \cos(0)\right) = \underline{\underline{-2}}$$

$$= \frac{1}{2} x^2 \Big|_0^{\pi} = \frac{1}{2}\pi^2 + 2 = \underline{\underline{\frac{1}{2}\left(\pi^2 + 4\right)}}$$

$$\iint f(x,y) = \iint \frac{e^{2\cdot\sin\left(\frac{x}{y}\right)} \cdot \cos\left(\frac{x}{y}\right) \cdot \frac{1}{y}}{}$$

$$A = \left\{ 1 \le y \le 3 \;,\; 0 \le x \le \frac{\pi}{2} y \right\}$$

gibt

man musste sehen, dass $\frac{1}{2} \cdot e^{2\cdot\sin\left(\frac{x}{y}\right)}$ abgeleitet

$$\frac{1}{2} \int_1^3 \underbrace{\left[e^{2\sin\left(\frac{x}{y}\right)} \right]_0^{\frac{\pi}{2}\cdot y}}_{\text{''}} dy = e^2 - 1 \approx 6{,}39$$

$$f(x,y) = \left(1 - \frac{16}{y} x\right) \cdot \sin\left(\frac{y}{1+x^2}\right) \Longrightarrow A = 0 \le x \le 1 \;,\; 0 \le y \le (1+x^2)\cdot\pi$$

$$\int \sin\left(\frac{y}{\text{„}x\text{“}}\right) dy \quad \Rightarrow \int_0^1 1 - \frac{16}{9}x \cdot \left[-\cos \frac{y}{(1+x^2)} \cdot (1+x^2) \right]_0^{(1+x^2)\cdot\pi}$$

$$\Rightarrow \int_0^1 \left(1 - \frac{16}{9}x\right)(1+x^2) \cdot \underbrace{\left[-\cos(\pi) - -\cos(0) \right]}_{2} \, dx$$

$$2 \int_0^1 \left(1 + x^2 - \frac{16}{9}x - \frac{16}{9}x^3\right) dx = 2 \left[x + \frac{1}{3}x^3 - \frac{16}{9}\cdot\frac{1}{2}x^2 - \frac{16}{9}\cdot\frac{1}{4}x^4 \right]_0^1$$

$$= 2 \cdot \left[x + \frac{1}{3}x^3 - \frac{16}{18}x^2 - \frac{16}{36}x^4 \right]_0^1 = 0$$