Homework #8

Problem 2 - 7.2.2:

We need to find $f(s)$ that solves the differential equation

$$(s^2+1)f'(s)+sf(s)=0. \tag{1}$$

From (1) we obtain:

$$f'(s)=\frac{df}{ds}=-\frac{sf(s)}{s^2+1}. \tag{2}$$

We can rearrange factors and integrate both sides of the equation

$$\int\frac{df}{f(s)}=-\int\frac{s}{s^2+1}ds, \tag{3}$$

then,

$$lnf=-\frac{1}{2}ln(s^2+1)+lnC, \tag{4}$$

where lnC is an integration constant. Exponentiating both sides we obtain:

$$f(s)=\frac{C}{\sqrt{s^2+1}}. \tag{5}$$