

Instructions: Show all work. Use exact answers unless otherwise asked to round.

1. Integrate  $\int \frac{x+1}{x(x^2+1)} dx$  with partial fractions.

$$\frac{A}{x} + \frac{Bx+C}{x^2+1} = \frac{x(Bx+C) + A(x^2+1)}{x(x^2+1)} = \frac{Bx^2+Cx + Ax^2+A}{x(x^2+1)}$$

$x^2$ :

$$A+B=0$$

$$C=1$$

$$A=1 \Rightarrow B=-1$$

$$\int \frac{1}{x} - \frac{x}{x^2+1} + \frac{1}{x^2+1} dx$$

$$\ln x - \frac{1}{2} \ln(x^2+1) + \arctan x + C$$