

## Quiz 6: Section 7.6, Problem 10

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Integrate the following integral. Make sure you explicitly state the partial fraction decomposition.

$$\int \frac{dx}{(x-3)(x+7)}$$

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We need to first find the partial fraction decomposition:

$$\begin{aligned} \frac{1}{(x-3)(x+7)} &= \frac{A}{x-3} + \frac{B}{x+7} \\ 1 &= A(x+7) + B(x-3) \end{aligned}$$

So when  $x = 3$ , we obtain  $1 = 10A$ , so  $A = 1/10$ . Similarly, if  $x = -7$  then  $1 = -10B$ , so  $B = -1/10$ . Hence,

$$\begin{aligned} \int \frac{dx}{(x-3)(x+7)} &= \int \frac{1/10}{x-3} - \frac{1/10}{x+7} dx \\ &= \frac{1}{10} \int \frac{1}{x-3} dx - \frac{1}{10} \int \frac{1}{x+7} dx \\ &= \frac{1}{10} \ln|x-3| - \frac{1}{10} \ln|x+7| + C \end{aligned}$$