

Problem 4 (15 points). Express the following as a single logarithm:

$$(5 \text{ points/a}) \ln(x+3) + \ln(x-7) \\ = \ln[(x+3)(x-7)] \quad \text{Using } \log_a M + \log_a N = \log_a M \cdot N$$

$$(5 \text{ points/b}) \frac{4}{3} \log(x-1) - \log(x+1) \\ = \log(x-1)^{\frac{4}{3}} - \log(x+1) \\ = \log \left[\frac{(x-1)^{\frac{4}{3}}}{(x+1)} \right] \quad \text{Using } r \log_a M = \log_a M^r \\ \text{Using } \log_a M - \log_a N = \log_a \frac{M}{N}$$

$$(5 \text{ points/c}) \log_2(x) + \frac{\log_3(x+7)}{\log_3 2} \\ = \log_2(x) + \log_2(x+7) \quad \text{Using } \frac{\log_b M}{\log_b a} = \log_a M \\ = \log_2[(x)(x+7)] \quad \text{Using } \log_a M + \log_a N = \log_a M \cdot N.$$