1 Logarithmic laws

1. Simplify (by expressing as the natural logarithm of a single number)

   (i) $4\ln 2 + 2\ln 5 - \ln 10$ (ii) $\ln 12 - 2\ln 3 + \ln 6$

2. Simplify (by expressing as a single natural logarithm)

   (i) $\ln(5x) - 4\ln(2x) + 2\ln(4x^2)$ (ii) $2\ln(x^2 y) + 3\ln x - \ln(x^3 y)$

3. Simplify (by expressing as the natural logarithm of a single number)

   (i) $2\ln 3 + 2\ln 5 - \ln 15$ (ii) $5\ln 2 - 2\ln 4 + \ln 7$

4. Simplify (by expressing as a single natural logarithm)

   (i) $\ln(8x) - 2\ln(2x) + 3\ln(2x^2)$ (ii) $3\ln(xy) + 2\ln x - \ln(x^3 y^2)$