2. $$\mathrm{f}(x) = \tanh^{-1}\left(\frac{3-x}{6+x}\right) \qquad |x| < \frac{3}{2}$$

(a) Show that

$$\mathrm{f}'(x) = -\frac{1}{2x+3}$$

(4)

(b) Hence determine $\mathrm{f}''(x)$

(1)

(c) Hence show that the Maclaurin series for $\mathrm{f}(x)$, up to and including the term in x^2, is

$$\ln p + qx + rx^2$$

where p, q and r are constants to be determined.

(3)