

1. Solve for all  $x$  at which the following curves intersect:

$$y = 3\sqrt{x-1}; \quad y = x + 1$$

2. Let  $\ln(x) = a$  and  $\ln(y) = b$ . Express the following expression in terms of  $a$  and  $b$  simplifying your answer as far as possible.

$$\ln \left( e^3 \cdot \sqrt{\frac{x^3}{y^4}} \right) =$$

**3.** Simplify the following expression giving your answer in the form  $\frac{ax+b}{(cx+d)^k}$  where  $a$ ,  $b$ ,  $c$ ,  $d$  and  $k$  are all constants.

$$\frac{(3x+5)^{5/2} \cdot 2 - (2x-4) \cdot \frac{5}{2}(3x+5)^{3/2} \cdot 3}{(3x+5)^5} \stackrel{?}{=}$$

4. Completely factor the expression below:

$$9x^4 - 37x^2 + 4 \stackrel{?}{=}$$

5. Express  $x$  in terms of  $y$  if they are related by:

$$\frac{e^x - 1}{2e^x + 1} = y.$$