

**Problem 4.12** Prove that  $(1 - 3x) = \sqrt{5x - 1}$  implies  $x = 2/9$

*Proof.* Suppose  $x$  satisfies  $(1 - 3x) = \sqrt{5x - 1}$ . Squaring both sides yields

$$\begin{aligned}5x - 1 &= (1 - 3x)^2 \\5x - 1 &= 1 - 6x + 9x^2 \\0 &= 2 - 11x + 9x^2.\end{aligned}$$

Using the quadratic formula gives

$$x = \frac{11 \pm \sqrt{11^2 - 4 \cdot 2 \cdot 9}}{2 \cdot 9} = \frac{11 \pm 7}{18} = 1, \frac{2}{9}.$$

However, the case of  $x = 1$  must be thrown out since

$$(1 - 3 \cdot 1) = -2 \neq 2 = \sqrt{5 \cdot 1 - 1}.$$

Hence  $x = \frac{2}{9}$ .

□