

11. (a) Use binomial expansions to show that  $\sqrt{\frac{1+4x}{1-x}} \approx 1 + \frac{5}{2}x - \frac{5}{8}x^2$  (6)

A student substitutes  $x = \frac{1}{2}$  into both sides of the approximation shown in part (a) in an attempt to find an approximation to  $\sqrt{6}$

(b) Give a reason why the student **should not** use  $x = \frac{1}{2}$  (1)

(c) Substitute  $x = \frac{1}{11}$  into

$$\sqrt{\frac{1+4x}{1-x}} = 1 + \frac{5}{2}x - \frac{5}{8}x^2$$

to obtain an approximation to  $\sqrt{6}$ . Give your answer as a fraction in its simplest form. (3)