



Level 1

$$(\dots)^n = \dots^n$$

- put here equal
- find x
- check x is small enough
- use x in expansion.

Level 2

choosing an expansion

$$2.99^4 = (1+x)^4$$

$$x = -0.01$$

$$2.99^4 = (3-x)^4$$

$$x = 0.01$$

Level 3

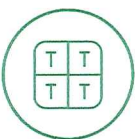
find a related approximation

$$2.99^4 = (10 \times 0.299)^4$$

$$= 10^4 \times 0.299^4$$

$$1+x = 0.299$$

$$x = -0.701 \text{ (U)}$$



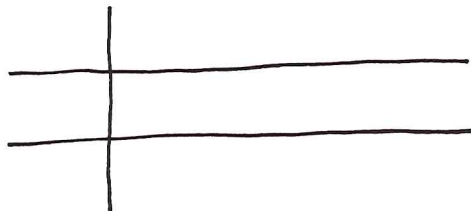
BINOMIAL EXPANSION APPROXIMATIONS

1	2	3	4	5
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APPROXIMATIONS

- (a) Use the 1st 3 terms of the expansion of $(3-2x)^7$ to approximate 2.8^7
- (b) Explain why the expansion $(1+x)^{15} \approx 1 + 15x + 105x^2 + 455x^3$ can't be used to estimate 2.01^{15}
- (c) Use $x = \frac{1}{10}$ in $(1-2x)^{-\frac{1}{2}} \approx 1 + x + \frac{3}{2}x^2 + \frac{5}{2}x^3$ to approximate $\sqrt{5}$

(a)



(b)

(c)

