

## Case study

### Problems

1. Solve for  $x$ :

(a)  $x^{x^2-7x+12} = 1$

(b)  $x^{((x+1)^2)} = x^{16}$

(c)  $x^{(x^x)} = (x^x)^x$

(d)  $\sqrt{x^{x+1}} = x^{\sqrt{x+1}}$

2. Find all the pairs  $(x, y)$  that satisfy the system  $\begin{cases} x^{x+y} = y^4 \\ y^{x+y} = x \end{cases}$

3. Solve for  $x$ :

(a)  $|2x - 1| - |x + 5| = 3$

(b)  $|x - 1| - |x - 3| \geq 5$

4. Sketch the graph of

(a)  $y = |x^2 - 1| - |x^2 - 4|$

(b)  $y = |x^2 - 4|x| + 3|$

(c)  $|x| + |y| = 1 + |xy|$

5. Sketch the region  $\{(x, y) \mid |x - y| + |x| - |y| \leq 2\}$