1. Solve the following equations.

   (a) $2^{3x+1} = 2^{5x-9}$

   (b) $3^{x+4} = 9^{x-5}$

   (c) $4 \cdot 8^{3x+2} = 2^{10x+6}$

   (d) $9 \cdot 3^{2x-1} = 27^{x+3}$

   (e) $5 \cdot 125^{x-2} = 25^{3x-2}$

   (f) $3^{x+3} - 3^{x+1} = 72$

   (g) $5^{2x+1} + 25^{x} = 30$

   (h) $9^{x-1} + 3^{2x+1} = \dfrac{28}{27}$

   (i) $3^{2x} - 12 \cdot 3^{x} + 27 = 0$

   (j) $2^{2x+2} - 33 \cdot 2x + 8 = 0$

   (k) $25 \cdot 5^{2x-1} + 24 \cdot 5^{x} - 5 = 0$

2. In 2020, Taneytown had a population of 2400. Its population doubles every 18 years. Storyville had a population of 600 in 2015, doubling every 12 years. In what year will the towns have equal populations?

   In 2077, 57 years later.