HW15 – U9D3 Exponential Transformations

Describe the transformation(s) of the parent function, \( f(x) = 4^x \), for each of the following functions.

1. \( f(x) = -4^{x+3} \)
   - Reflection over x-axis
   - Shift 3 units LEFT

2. \( f(x) = \frac{1}{4} \cdot 4^x + 20 \)
   - Vertical shrink: factor \( \frac{1}{4} \)
   - Shift 20 units UP

3. \( f(x) = 4^{x-1} - 25 \)
   - Shift right 1 unit
   - Shift down 25 units

4. \( f(x) = 6 \cdot 4^{2x} \)
   - Vertical stretch 6

Graph each of the functions using transformations.

5. \( y = 5 \cdot 2^x \)

6. \( y = \left(\frac{1}{4}\right)^{x-2} - 1 \)

Asymptote: \( y = -1 \)
Write the equation for the function described below. All are using the parent function $f(x) = 6^x$.

9. shift up 30 and left 5

$$f(x) = 6^{x+5} + 30$$

11. vertically stretch by a factor of 7

$$f(x) = 7 \cdot 6^x$$

13. shift down 7 and right 3

$$f(x) = 6^{x-3} - 7$$

10. reflect over the x-axis and shift right 2

$$f(x) = -6^{x-2}$$

12. reflect over the y-axis and horizontally stretch by a factor of 2.

$$f(x) = 6^{-x}$$

14. shrink vertically by a factor of 1/3

$$f(x) = \frac{1}{3} \cdot 6^x$$