

Solve each equation.

1) $5^{-3p} = 5^{3p+2}$

2) $\frac{4^b}{4^{2-3b}} = 16$

3) $16^{-x} = \left(\frac{1}{64}\right)^{-3x-3}$

4) $81^{x-3} = 9^{2x}$

5) $25 \cdot 625^{n-3} = \left(\frac{1}{5}\right)^{3n}$

6) $\left(\frac{1}{4}\right)^{2k-1} \cdot \left(\frac{1}{16}\right)^{-k} = 4$

Sketch the graph of each function. State the DOMAIN, RANGE, END BEHAVIOR or each. Describe the TRANSFORMATIONS in each. DO ALL PROBLEMS ON ACCOMPANYING GRAPH PAPER.

$$7) f(x) = -\frac{1}{2} \cdot \left(\frac{1}{2}\right)^{x-2} + 1$$

$$8) y = 2^{x+1} - 2$$

$$9) y = 3 \cdot \left(\frac{1}{2}\right)^{x-1} + 1$$

$$10) y = -\frac{1}{3} \cdot \left(\frac{1}{2}\right)^{x-1} - 1$$

$$11) y = 2 \cdot 3^{x+2} + 1$$

$$12) y = -2 \cdot 2^{x+1} - 2$$

- 13) During normal breathing, about 12% of the air in the lungs is replaced after one breath. Write an exponential model for the amount of the original air left in the lungs if the initial amount of air in the lungs is 500 ml.
- 14) You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by 15%. Write an exponential model for the amount of caffeine in your system. How long until you have 10 mg of caffeine?
- 15) The foundation of your house has about 1,200 termites. The termites grow at a rate of 2.4% per day. How long until the number of termites doubles?
- 16) A savings account currently has a balance of \$250,000. If this particular account earns 3.9% interest compounded monthly for 20 years, what was the original deposit into the account?

Describe the end behavior of each function.

17) $f(x) = -x^4 + x^2 - 2$

18) $f(x) = x^5 - 4x^3 + x + 1$

Identify the domain, range, and end behavior of each.

19) $y = 2\sqrt[3]{x} + 4$

20) $y = \sqrt{25x - 100} - 4$

21) $f(x) = \frac{2}{x-2} - 2$

22) $f(x) = -\frac{1}{x-2}$