4.1 and 4.2 - Exponential functions

Review problems

1. **Operations on exponents**. Simplify. Write answers with only positive exponents.

(a) $\dfrac{(2x^3y)^4}{(2xy^{-1})^3}$ 　　(b) $(16x^4y^8)^{3/4}$

Basic knowledge

2. Given function $f(x) = 3 \cdot 4^{-x+1}$ evaluate:

(a) $f(3)$, 　　(b) $f(-2)$ 　　(c) $f(0)$ 　　(d) $f\ \frac{3}{2}$

3. Sketch the graph of each function. Label the asymptote (if any) and at least two points on each graph.

(a) $y = 2^{x-1}$ 　　(b) $y = -e^x + 4$ 　　(c) $y = e - x$

4. Solve equation (hint: find the common base first): 　$4^{x-5} = 8^{5x+1}$

Intermediate

5. Solve each equation:

(a) $16^{-3x+2} = \dfrac{1}{32}$ 　　(b) $(\sqrt{5})^{1-x} = 5^x$

6. The population of Notown can be approximated by function $P(t) = 10 \cdot 2^{t/10} + 50$, where P is in thousands of people and t represents years after 1985. Find the population of Notown

(a) in 1985, (b) in 2005, (c) in 2035

Advanced

7. Sketch the graph of the given function. Label the asymptote and at least two points on the graph.

$y = 2 \cdot \frac{2}{3}^{-x+3} - 10$

8. The population of bacteria in decreasing according to the function $P(t) = a2^{bt}$, where t is the number of hours since the beginning of an experiment. Find the values of a and b if there were 100 bacteria initially present, and there were 25 bacteria after 2 hours since the beginning of the experiment.