Section 1: Exponential functions and logarithms

Exercise level 2

1. Write the following in terms of log 2 and log 3:

    (i) log 12

    (ii) $\log\left(\dfrac{16}{27}\right)$

    (iii) $\log \sqrt{54}$

    (iv) $\log \dfrac{\sqrt{3}}{16}$

2. Solve the following equations:
    (i) $2^x = 18$
    (ii) $5^x = 100$
    (iii) $1.5^x = 0.001$
    (iv) $10^x = 2$

3. Solve the equations:
    (i) $\log_3 x = -\tfrac{1}{2}$
    (ii) $2\log x + \log 10 = \log 90$
    (iii) $\log_{10}\left(\dfrac{1}{x}\right) = -3$
    (iv) $\log x + \log y = \tfrac{1}{2}\log\left(9y^2\right)$

4. Money in a savings account earns 4% interest per year. The amount of money in Claire's savings account is modelled as $P = 500 \times 1.04^t$, where t is the number of years. Interest is paid at the end of each month.
    (i) What is the total amount, to the nearest penny, in Claire's account after
         (a)   1 month
         (b)   6 months
         (c)   1 year
         (d)   5 years
    (ii) After how long (in years and months) will the amount in the account first exceed £800?

5. Solve the equations:
    (i) $3^a = 21$
    (ii) $(1.005)^x = 1.1$
    (iii) $50^{\frac{1}{a}} = 10$
    (iv) $\left(1 + \dfrac{x}{100}\right)^{12} = 1.25$

6. Interpret the question and answer to 5(iv) above, in the context of the monthly interest rate charged for a debt on a credit card.

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