

1. Simplify.

a) $\frac{\frac{1}{3} + \frac{1}{4}}{\frac{1}{5} - \frac{1}{6}}$

b) $\frac{a + \frac{3}{b}}{\frac{b}{a} - \frac{1}{b}}$

c) $\frac{6 - \frac{2-z}{z}}{\frac{1}{3z} - \frac{1}{6}}$

d) $\frac{\frac{1}{x^2y^2} + \frac{1}{xy^3}}{\frac{1}{x^3y} - \frac{1}{xy}}$

e) $\frac{\frac{x}{x-5} - 2}{\frac{2x}{5-x} - 1}$

f) $\frac{\frac{3}{2+x} - \frac{4}{2-x}}{\frac{1}{x+2} - \frac{3}{x-2}}$

g) $\frac{\frac{1}{x+h} - \frac{1}{x}}{h}$

h) $\frac{\frac{1}{b^2} - \frac{1}{c^2}}{\frac{1}{b^3} + \frac{1}{c^3}}$

i) $\frac{\frac{y^2-y-6}{y^2-5y-14}}{\frac{y^2+6y+5}{y^2-6y-7}}$

j) $\frac{x+y}{y^{-1}+x^{-1}}$

2. Are $\frac{a^{-1}+b^{-1}}{a^{-2}+b^{-2}}$ and $\frac{a^2+b^2}{a+b}$ equivalent?

3. Simplify.

a) $\frac{2m^{-1}-3m^{-2}}{m^{-2}}$

b) $(x^{-1} + y^{-1})^{-1}$

4. For each function, find and simplify the **difference quotient** $\frac{f(a+h)-f(a)}{h}$.

a) $f(x) = \frac{5}{x}$

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

5. The **harmonic mean** of two numbers x_1 and x_2 is defined as $\frac{2}{\frac{1}{x_1} + \frac{1}{x_2}}$.

Find the harmonic mean of 1 and 2.

6. Simplify each **continued fraction**.

a) $\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{2}}}}$

b) $\frac{1}{1 + \frac{1}{1 + \frac{1}{1 + \frac{1}{x}}}}$