Mathe 1 Tutorium MS

Aufgabenblatt 1: Lösungen

Aufg. 1: Vereinfachen Sie die folgenden Ausdrücke.

a) $\frac{1}{5}+\frac{2}{3}=\frac{3}{15}+\frac{10}{15}=\frac{13}{15}$

b) $\frac{2}{7}\cdot\frac{3}{4}+\frac{1}{10}=\frac{6}{28}+\frac{1}{10}=\frac{60}{280}+\frac{28}{280}=\frac{88}{280}=\frac{11}{35}$

c) $\frac{\frac{1}{15}}{\frac{2}{3}}+\frac{1}{2}=\frac{1}{15}\cdot\frac{3}{2}+\frac{1}{2}=\frac{3}{30}+\frac{1}{2}=\frac{1}{10}+\frac{5}{10}=\frac{6}{10}=\frac{3}{5}$

d) $\left(\frac{1}{2}\right)^{\frac{1}{2}}+\frac{3}{4}=\frac{1}{\sqrt{2}}+\frac{3}{4}=\frac{4}{4\cdot\sqrt{2}}+\frac{3\cdot\sqrt{2}}{4\cdot\sqrt{2}}=\frac{4+3\cdot\sqrt{2}}{4\cdot\sqrt{2}}$

e) $\sqrt{\frac{3600}{16}}=\frac{\sqrt{3600}}{\sqrt{16}}=\frac{60}{4}=15$

f) $0,75+\frac{1}{2}-\frac{2}{3}\cdot 3=\frac{3}{4}+\frac{1}{2}-2=\frac{3}{4}+\frac{2}{4}-\frac{8}{4}=-\frac{3}{4}$

g) $\left(\frac{4}{6}\cdot\frac{1}{2}\right)^3=\left(\frac{4}{12}\right)^3=\frac{1^3}{3^3}=\frac{1}{27}$

h) $\frac{\left(\frac{1}{7}\right)^3-\frac{1}{2}\cdot\frac{2}{7}}{\frac{2}{9}}=\left(\frac{1}{343}-\frac{1}{7}\right)\cdot\frac{9}{2}=\left(\frac{1}{343}-\frac{49}{343}\right)\cdot\frac{9}{2}=-\frac{48}{343}\cdot\frac{9}{2}=\frac{216}{343}$

i) $\frac{\frac{3}{4}}{\frac{4}{5}\cdot\frac{23}{9}-\frac{1}{6}}-\frac{\frac{7}{36}\cdot\frac{3}{7}}{\frac{92}{45}-\frac{1}{6}}=\frac{\frac{1}{12}-\frac{1}{12}}{\frac{92}{45}-\frac{1}{6}}=0$

Aufg. 2: Vereinfachen Sie die folgenden Ausdrücke.

a) $\frac{a^2\cdot a^8}{a^3}=\frac{a^{10}}{a^3}=a^7$

b) $\frac{\sqrt{40}}{\sqrt{4}}\cdot\sqrt{10}=\frac{\sqrt{400}}{\sqrt{4}}=\sqrt{100}=10$

c) $\frac{1}{2}^3\cdot 2^3=\left(\frac{1}{2}\cdot 2\right)^3=1$

d) $\sqrt[5]{x^2}\cdot\sqrt{x}=x^{\frac{2}{5}}\cdot x^{\frac{1}{2}}=x^{\frac{1}{5}+\frac{1}{2}}=x^{\frac{7}{10}}=\sqrt[10]{x^7}$

e) $\frac{5^3}{5^2}\cdot\sqrt{5}=5^1\cdot 5^{\frac{1}{2}}=5^{\frac{3}{2}}=\sqrt{5^3}$

f) $\frac{\sqrt[4]{7}}{\sqrt[6]{5}} = \frac{\sqrt[4]{7}}{\sqrt[6]{5}} \rightarrow$ *keine Vereinfachung möglich*

g) $y^{\frac{1}{3}} \cdot x^{\frac{1}{2}} - \sqrt[3]{y} = \sqrt[3]{y} \cdot \left(\sqrt{x} - 1\right)$

h) $\frac{100^5}{10^4} \cdot 10^{-6} = \frac{10^{10-6}}{10^4} = 1$

i) $\left(\left(y^4\right)^2 - b^3\right)^2 = \left(y^8 - b^3\right)$

Aufg. 3: Vereinfachen Sie die folgenden Ausdrücke.

a) $\log_2\left(1024\right) = 10$

b) $\ln\left(e^2\right) = 2$

c) $\ln\left(\frac{e^7}{e^4}\right) = \ln\left(e^3\right) = 3$

d) $\log_9\left(81\right) = 2$

e) $\log_{10}\left(100.000.000\right) = \log_{10}\left(10^8\right) = 8$

f) $\log_2\left(\frac{1}{2}\right) = -1$

g) $\log_3\left(3\right) + \log_3\left(9\right) = \log_3\left(9 \cdot 3\right) = 3$

h) $\log_6\left(\sqrt[4]{216^2}\right) = \frac{2}{4} \cdot \log_6\left(216\right) = \frac{3}{2}$

i) $\frac{\log_7\left(2^{10}\right)}{10} = \frac{10 \cdot \log_7\left(2\right)}{10} = \log_7\left(2\right)$

Aufg. 4: Klammern Sie aus.

a) $\left(x-3\right)^2 = x^2 - 6x + 9$

b) $\left(\frac{a^2}{4} - 3\right) \cdot \left(\frac{a^2}{4} + 3\right) = \frac{a^4}{16} - 9$

c) $\left(\sqrt{3} + x^3\right)^2 = 3 + \sqrt{12} \cdot x^3 + x^6$

d) $\left(x+4\right)^4 = x^4 + 16x^3 + 96x^2 + 256x + 256$

e) $\left(5 - x^2\right)^3 = 125 - 75x^2 + 15x^4 - x^6$

f) $\left(n - e^2\right)^2 + \left(3n + \frac{e}{2}\right)^2 = n^2 - 2n \cdot e^2 + e^4 + 9n^2 + 3n \cdot e + \frac{e^2}{4} = 10n^2 + e^2\left(\frac{1}{4} - 2n\right) + 3n \cdot e + e^4$

g) $\left(x-1\right)^7 = x^7 - 7x^6 + 21x^5 - 35x^4 + 35x^3 - 21x^2 + 7x - 1$

h) $\left(x^2 - 2\right) \cdot \left(x^2 - 2\right) = x^4 - 4x^2 + 4$