

7. Lineare Gleichungen und Ungleichungen mit einer Variablen

7.1 Gleichungen

1. Jede Einsetzung eines Elements aus der Grundmenge G in die Aussageform ergibt eine falsche Aussage.
2. Jede Einsetzung eines Elements aus G in die Aussageform ergibt eine falsche Aussage.
3. Die Einsetzungen 1,2 und $\frac{1}{2}$ ergeben falsche Aussagen. Die Einsetzung $\frac{3}{5}$ ergibt eine wahre Aussage.
4. Alle Einsetzungen aus G ergeben falsche Aussagen.
5. Alle Einsetzungen aus G ergeben wahre Aussagen.

1. a) $\mathbb{L} = \{5\}$ b) $\mathbb{L} = \{3\}$ c) $\mathbb{L} = \{112\}$ d) $\mathbb{L} = \{-2\}$ e) $\mathbb{L} = \{3\frac{1}{3}\}$
f) $\mathbb{L} = \{0\}$ g) $\mathbb{L} = \{2\}$ h) $\mathbb{L} = \{\frac{2}{6}\}$ i) $\mathbb{L} = \{3\frac{4}{5}\}$
2. a) $\mathbb{L} = \{15\}$ b) $\mathbb{L} = \{5\}$ c) $\mathbb{L} = \{8,1\}$ d) $\mathbb{L} = \{1\}$
e) $\mathbb{L} = \{16\}$ f) $\mathbb{L} = \{-16\}$ g) $\mathbb{L} = \{5\}$ h) $\mathbb{L} = \{15\}$
i) $\mathbb{L} = \{-9\}$ j) $\mathbb{L} = \{3\}$ k) $\mathbb{L} = \{4,5\}$ l) $\mathbb{L} = \{3\}$
3. a) $\mathbb{L} = \{6\}$ b) $\mathbb{L} = \{4\}$ c) $\mathbb{L} = \{-1\frac{4}{7}\}$ d) $\mathbb{L} = \{36\}$
e) $\mathbb{L} = \{2\}$ f) $\mathbb{L} = \{2\}$ g) $\mathbb{L} = \{12\}$ h) $\mathbb{L} = \{10\}$
4. a) $\mathbb{L} = \{4\}$ b) $\mathbb{L} = \{3\}$ c) $\mathbb{L} = \{4\}$ d) $\mathbb{L} = \{\frac{1}{2}\}$
e) $\mathbb{L} = \{144\}$ f) $\mathbb{L} = \{60\}$
5. a) $\mathbb{L} = \{\frac{c}{a+b}\}$ b) $\mathbb{L} = \{\frac{a-b}{a+b}\}$ c) $\mathbb{L} = \{1\}$
d) $\mathbb{L} = \{\frac{b}{a-1}\}$ e) $\mathbb{L} = \{\frac{1}{a+b-c}\}$ f) $\mathbb{L} = \{a+b\}$
6. a) $\mathbb{L} = \{4\}$ b) $\mathbb{L} = \{6\}$ c) $\mathbb{L} = \{8\}$
d) $\mathbb{L} = \{12\}$ e) $\mathbb{L} = \{10\}$ f) $\mathbb{L} = \{8\}$

7. a) $\mathbb{L} = \{\frac{b}{a-1}\}$ b) $\mathbb{L} = \{1\}$ c) $\mathbb{L} = \{\frac{c}{a-b}\}$ d) $\mathbb{L} = \{2\}$
e) $\mathbb{L} = \{\frac{2ab}{2a-3b}\}$ f) $\mathbb{L} = \{\frac{a+c}{b}\}$
8. a) $\mathbb{L} = \{1\}$ b) $\mathbb{L} = \{4\}$ c) $\mathbb{L} = \{8\}$ d) $\mathbb{L} = \{40\}$ e) $\mathbb{L} = \{a-b\}$
9. a) $\mathbb{L} = \{5\}$ b) $\mathbb{L} = \{6\}$ c) $\mathbb{L} = \{6\}$ d) $\mathbb{L} = \{2\}$ e) $\mathbb{L} = \{-1\}$
f) $\mathbb{L} = \{-\frac{4}{25}\}$ g) $\mathbb{L} = \{4\}$ h) $\mathbb{L} = \{1,25\}$
10. a) $\mathbb{L} = \{0\}$ b) $\mathbb{L} = \{9\}$ c) $\mathbb{L} = \{4\}$ d) $\mathbb{L} = \{2\}$ e) $\mathbb{L} = \{\frac{1}{3}\}$
f) $\mathbb{L} = \{1\}$ g) $\mathbb{L} = \{2\}$
11. a) $\mathbb{L} = \{\frac{b^2}{a}\}$ b) $\mathbb{L} = \{a\}$ c) $\mathbb{L} = \{\frac{ab}{a+b}\}$ d) $\mathbb{L} = \{1\}$
e) $\mathbb{L} = \{-a\}$ f) $\mathbb{L} = \{\frac{b+a}{2}\}$ g) $\mathbb{L} = \{\frac{a}{2}\}$ h) $\mathbb{L} = \{0\}$
12. a) $\mathbb{L} = \{48\}$ b) $\mathbb{L} = \{36\}$ c) $\mathbb{L} = \{20\}$ d) $\mathbb{L} = \{1200\}$
e) $\mathbb{L} = \{30\}$ f) $\mathbb{L} = \{40\}$
13. a) $\mathbb{L} = \{27\}$ b) $\mathbb{L} = \{60\}$ c) $\mathbb{L} = \{6\}$ d) $\mathbb{L} = \{42\}$
e) $\mathbb{L} = \{-3\}$ f) $\mathbb{L} = \{20\}$
14. a) $\mathbb{L} = \{19\}$ b) $\mathbb{L} = \{20\}$ c) $\mathbb{L} = \{7\}$ d) $\mathbb{L} = \{2\}$
e) $\mathbb{L} = \{125\}$ f) $\mathbb{L} = \{5\}$
15. a) $\mathbb{L} = \{5\}$ b) $\mathbb{L} = \{6\}$ c) $\mathbb{L} = \{2\}$ d) $\mathbb{L} = \{44\}$
e) $\mathbb{L} = \{6\}$ f) $\mathbb{L} = \{3\frac{2}{4}\}$
16. a) $\mathbb{L} = \{5\}$ b) $\mathbb{L} = \{1\}$ c) $\mathbb{L} = \{4\}$ d) $\mathbb{L} = \{3\}$
e) $\mathbb{L} = \{7\}$ f) $\mathbb{L} = \{10\}$
17. a) $\mathbb{L} = \{\frac{abc}{bc+ac+ab}\}$ b) $\mathbb{L} = \{ab\}$ c) $\mathbb{L} = \{c \cdot (a+b)\}$
d) $\mathbb{L} = \{ab\}$ e) $\mathbb{L} = \{\frac{3a^2-2b^2+ab}{3a-2b}\}$ f) $\mathbb{L} = \{\frac{a}{2}\}$
g) $\mathbb{L} = \{\frac{a^2+b^2}{2ab}\}$ h) $\mathbb{L} = \{\frac{1}{a+b}\}$

18. a) $\mathbb{L} = \left\{ \frac{1}{5} \right\}$ b) $\mathbb{L} = \left\{ 7\frac{1}{2} \right\}$ c) $\mathbb{L} = \{24\}$ d) $\mathbb{L} = \{60\}$
 e) $\mathbb{L} = \{6\}$ f) $\mathbb{L} = \{3\}$

19. a) $\mathbb{L} = \{3\}$ b) $\mathbb{L} = \{4\}$ c) $\mathbb{L} = \{4\}$ d) $\mathbb{L} = \{2\}$
 e) $\mathbb{L} = \{5\}$ f) $\mathbb{L} = \{5\}$ g) $\mathbb{L} = \{7\}$ h) $\mathbb{L} = \{2\}$
 i) $\mathbb{L} = \{10\}$

20. a) $\mathbb{L} = \{2\}$ b) $\mathbb{L} = \left\{ \frac{1}{2} \right\}$ c) $\mathbb{L} = \left\{ \frac{a(b+1)}{b-1} \right\}$ d) $\mathbb{L} = \left\{ \frac{a-b}{a+b} \right\}$
 e) $\mathbb{L} = \left\{ \frac{ab}{a+b} \right\}$ f) $\mathbb{L} = \left\{ \frac{1-a}{1+a} \right\}$ g) $\mathbb{L} = \{1\}$ h) $\mathbb{L} = \{0\}$
 i) $\mathbb{L} = \{0\}$

21. a) $\mathbb{L} = \{3\}$ b) $\mathbb{L} = \left\{ \frac{5}{7} \right\}$ c) $\mathbb{L} = \{16\}$ d) $\mathbb{L} = \{10\}$
 e) $\mathbb{L} = \{7\}$

22. a) $\mathbb{L} = \left\{ \frac{1}{2} \right\}$ b) $\mathbb{L} = \left\{ -2\frac{1}{2} \right\}$ c) $\frac{5x}{2(x-1)} - \frac{x}{3(x-1)} = 2$; $\mathbb{L} = \{-12\}$
 d) $\mathbb{L} = \{9\}$ e) $\mathbb{L} = \{11\}$ f) $\mathbb{L} = \{2\}$

23. a) $\mathbb{L} = \{7\}$ b) $\mathbb{L} = \{7\}$ c) $\mathbb{L} = \left\{ 5\frac{1}{2} \right\}$ d) $\mathbb{L} = \{7\}$
 e) $\mathbb{L} = \{6\}$ f) $\mathbb{L} = \{ \}$

24. a) $\mathbb{L} = \{1\}$ b) $\mathbb{L} = \left\{ \frac{11}{7} \right\}$ c) $\mathbb{L} = \left\{ 10\frac{2}{7} \right\}$
 d) $\frac{2}{2x-3} + \frac{5}{3(x+2)} = \frac{5}{x+2}$; $\mathbb{L} = \{3\}$ e) $\mathbb{L} = \{8\}$
 f) $\frac{9}{x-5} - \frac{28}{7(5-x)} = \frac{5}{x-9} \Rightarrow \frac{9}{x-5} + \frac{28}{7(x-5)} = \frac{5}{x-9}$; $\mathbb{L} = \left\{ 11\frac{1}{2} \right\}$

25. a) $\frac{x-4}{x-1} + \frac{3x-5}{5(x-1)} = 2 - \frac{5x-1}{7(x-1)}$; $\mathbb{L} = \{10\}$
 b) $\frac{3x+2}{5(x-2)} - \frac{2x-1}{3(x-2)} + \frac{8x+2}{x-2} = 10$; $\mathbb{L} = \{11\}$
 c) $\frac{3x+3}{4(x-8)} - 2 + \frac{x+1}{x-8} = \frac{3(x-1)}{2(x-8)}$; $\mathbb{L} = \{11\}$
 d) $\mathbb{L} = \{ \}$

26. a) $\mathbb{L} = \{6\}$ b) $\mathbb{L} = \left\{ \frac{2}{3} \right\}$ c) $\mathbb{L} = \left\{ \frac{1}{3} \right\}$ d) $\mathbb{L} = \{2\}$