Calculus and Linear Algebra:
Review of Arithmetic

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Problem 1.1 *Given the following sets* $S = \{1, 2, 3, 6, 7, 9\}$ *and* $R = \{2, 4, 5, 6, 7\}$ *state*

a) $S \cup R$

b) $S \cap R$

c) $S \setminus R$

d) $R \setminus S$

e) $|S|$

f) $|R \setminus S|$

Problem 1.2 *State these expression as simple rational numbers or fractions:*

a) $\frac{7}{3} - \frac{1}{2}$

b) $\pi + \frac{3}{5}$

c) $\frac{3x^2}{a} + 2x$

d) $\frac{a}{4x^2} - \frac{x^2}{a}$

e) $\frac{1}{\frac{a}{(x^2+1)}} - \frac{1}{a}$

f) $\frac{a}{2b+3a} - \frac{b}{a+1}$

Problem 1.3 *Using the rules for exponentials simplify the following expressions:*

a) $10^3 \cdot 5^{-2}$ *(hint* $10 = 2 \cdot 5$*)*

b) $\frac{3^5}{3^2}$

c) $5 \cdot 25^8$ *(hint* $25 = 5^2$*)*

d) $2^3 \sqrt[5]{6^{10}}$ *(hint* $6 = 3 \cdot 2$*)*

e) $\sqrt[3]{7^{-21}}$

f) $\sqrt[4]{(2^2)^5}$

Problem 1.4 *Write the following inequalities as intervals of the real line*

a) $x \leq 100$

b) $x > 0$ *and* $x < 10$

c) $x \geq -10$ *and* $x < 5$

d) $x \geq -1$

e) $x < -5$ *or* $x \geq 5$

f) $x \neq 3$

Problem 1.5 *Solve the following inequalities for x:*

a) $6x - 5 > 7$

b) $-2x \geq 4$

c) $5x - 3 < 7 - 3x$

d) $\frac{6-x}{-4} \geq \frac{3x-4}{2}$

e) $\frac{1}{x} > 6$

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

g) $\frac{x}{2-x} < 0$

h) $\frac{x^2-1}{x-3} \geq 0$