MA 202-002/003 S18 HW1 Solutions

9.1.8 Show each number is rational by writing it in the form $\frac{a}{b}$, where a and b are integers and $b \neq 0$.

a) $-1.9 = \boxed{\frac{-19}{10}}$ b) $0 = \boxed{\frac{0}{1}}$ c) $2.\overline{6}$ Let $x = 2.\overline{6}$. Then $10x = 26.\overline{6}$, so

$9x = 10x - x = \cancel{2.\overline{6} - 26.\overline{6}}\ 26.\overline{6} - 2.\overline{6}$
$= 24$

$x = \frac{24}{9} = \boxed{\frac{8}{3} = 2.\overline{6}}$

d) $-3\frac{1}{5} = -3 + \frac{1}{5} = \frac{-15+1}{5} = \boxed{\frac{-14}{5}}$

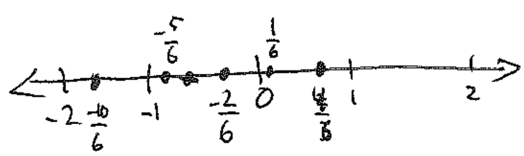
9.1.12 a) $\frac{-7}{21}$ and $\frac{6}{-18}$: check $-7 \cdot -18 = 126$, $6 \cdot 21 = 126$, so $\frac{-7}{21} = \frac{6}{-18}$.

b) $\frac{3}{15}$ and $\frac{5}{20}$: check $3 \cdot 20 = 60$, $5 \cdot 15 = 75$, so $\frac{3}{15} \neq \frac{5}{20}$

c) $\frac{-12}{26}$ and $\frac{-18}{39}$: check $-12 \cdot 39 = -2^2 \cdot 3^2 \cdot 13$, $26 \cdot (-18) = 2 \cdot 13 \cdot (-2) \cdot 3^2 = -2^2 \cdot 3^2 \cdot 13$
so $\frac{-12}{26} = \frac{-18}{39}$

d) $\frac{33}{-55}$ and $\frac{-6}{11}$: check $33 \cdot 11 = 363$, $-55 \cdot -6 = 330$, so $\frac{33}{-55} \neq \frac{-6}{11}$

9.1.16 Get a common denominator of 6: $\frac{2}{3} = \frac{4}{6}$, $-\frac{1}{3} = \frac{-2}{6}$, $-\frac{5}{3} = \frac{-10}{6}$, $-\frac{5}{6}$, $\frac{1}{6}$



9.1.18 a) add. inverse: 4
mult. inverse: $-\frac{1}{4}$

b) add. inverse: $-\frac{9}{10}$
mult inverse: $\frac{10}{9}$

c) add. inverse: $-\frac{15}{8}$
mult. inverse $\frac{8}{15}$

d) add. inverse: $\frac{1}{12}$
mult. inverse: $\frac{12}{1} = 12$

9.1.20 a) ~~Zero property of~~ Zero product property b) Commutative property of addition c) Additive inverse property d) Multiplicative identity property

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9.1.24 b) $\frac{8}{3} - \left(-\frac{5}{3}\right) = \frac{8}{3} + \frac{5}{3} = \boxed{\frac{13}{3}}$ d) $-\frac{3}{4} + \frac{1}{6} + \frac{5}{8} = -\frac{18}{24} + \frac{4}{24} + \frac{15}{24} = \boxed{\frac{1}{24}}$

f) $-\frac{7}{3} \cdot \frac{2}{9} = \boxed{\frac{-14}{27}}$ h) $-\frac{10}{27} \cdot \frac{9}{5} \div \left(-\frac{4}{7}\right) = \frac{\cancel{-10}^{-1}}{\cancel{27}_{3}} \cdot \frac{\cancel{9}^{1}}{\cancel{5}_{1}} \cdot \frac{-7}{\cancel{4}_{2}} = \boxed{\frac{7}{6}}$

9.1.26) a) True. Any whole number a is an integer so can be written as $\frac{a}{1}$.

b) True. By dividing $\frac{a}{b}$, there are are only $b-1$ possible remainders at each step, so the remainder must repeat.

c) False. $-\frac{1}{4}$ is rational but any ratio of whole numbers is positive.

9.1.30) {positive fractions} is not closed under subtraction because e.g. $\frac{2}{7} - \frac{5}{7} = -\frac{3}{7}$ is negative. The rational numbers, real numbers, and complex numbers all contain all possible differences of positive fractions.

9.1.38) a) $-\frac{6}{13}$: Cancel 5's, 4 between 4 & 8, 2 between 12 & 8.

b) $\left(\frac{7}{9}-7\right)\frac{9}{7} = -8$: distributive property & mult. inverses

c) $\frac{10}{3} + \frac{1}{3} + \left(-\frac{10}{3}\right) = \frac{1}{3}$: commutativity & add. inverses

d) $\frac{4}{15}\cdot\frac{1}{6} + \left(-\frac{4}{15}\right)\cdot\frac{1}{6}$: add. inverses
$= 0$

9.1.46) a) difference in equity from yr 1 to yr 3 = yr 3 equity − yr 1 equity

$= -3/5 - \left(-2\frac{7}{20}\right)$

$= -3/5 + 2\frac{7}{20}$

$= -\frac{12}{20} + \frac{47}{20} = \frac{35}{20} = \frac{7}{4} = \$1.75$ thousand $= \boxed{\$1{,}750.}$

b) # times greater $= \dfrac{\text{yr 5 equity}}{\text{yr 4 equity}} = \dfrac{1\frac{1}{10}}{\frac{9}{20}} = \dfrac{11}{10}\cdot\dfrac{20}{9} = \boxed{\dfrac{22}{9}}$

c) Average increase in equity per year = $\dfrac{(\text{increase year 1 to 2}) + (\text{increase year 2 to 3}) + (\text{increase year 3 to 4}) + (\text{increase year 4 to 5})}{4}$

$= \dfrac{\text{net change from year 1 to 5}}{4}$

$= \dfrac{1\frac{1}{10} - \left(-2\frac{7}{20}\right)}{4}$

$= \dfrac{\frac{22}{20} + \frac{47}{20}}{4} = \boxed{\dfrac{69}{80}}$ thousands of dollars

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9.1.48) $\frac{5}{16}$ of the woman's life pass before the master's, $\frac{1}{2} = \frac{8}{16}$ passes working, so the remaining 15 years are $\frac{16}{16} - \frac{5}{16} - \frac{8}{16} = \frac{3}{16}$ of her life. So her life is $\frac{16}{3}$(15 years) = 80 years long.