Name: *Caleb McWhorter — Solutions*
MATH 101
Fall 2023
HW 2: Due 09/13

Problem 1. (10pt) Showing all your work, reduce the following rational numbers:

(a) $\frac{10}{140}$

(b) $\frac{154}{33}$

(c) $\frac{19}{17}$

(d) $\frac{36}{18}$

(e) $\frac{35}{45}$

Solution.

(a) We have...
$$\frac{10}{140} = \frac{1 \cdot 10}{14 \cdot 10} = \frac{1 \cdot \cancel{10}}{14 \cdot \cancel{10}} = \frac{1}{14}$$

(b) We have...
$$\frac{154}{33} = \frac{14 \cdot 11}{3 \cdot 11} = \frac{14 \cdot \cancel{11}}{3 \cdot \cancel{11}} = \frac{14}{3}$$

(c) We have...
$$\frac{19}{17} = \frac{19}{17}$$

(d)
$$\frac{36}{18} = \frac{2 \cdot 18}{1 \cdot 18} = \frac{2 \cdot \cancel{18}}{1 \cdot \cancel{18}} = \frac{2}{1} = 2$$

(e)
$$\frac{35}{45} = \frac{7 \cdot 5}{9 \cdot 5} = \frac{7 \cdot \cancel{5}}{9 \cdot \cancel{5}} = \frac{7}{9}$$

Problem 2. (10pt) Showing all your work and simplifying as much as possible, compute the following:

(a) $\frac{7}{2} - \frac{2}{5}$

(b) $\frac{3}{4} + \frac{11}{12}$

(c) $\frac{11}{25} + \frac{8}{20}$

(d) $-\frac{6}{5} + \frac{7}{11}$

(e) $\frac{1}{3} - \frac{5}{7} + \frac{13}{12}$

Solution.

(a)
$$\frac{7}{2} - \frac{2}{5} = \frac{7}{2} \cdot \frac{5}{5} - \frac{2}{5} \cdot \frac{2}{2} = \frac{35}{10} - \frac{4}{10} = \frac{35 - 4}{10} = \frac{31}{10}$$

(b)
$$\frac{3}{4} + \frac{11}{12} = \frac{3}{4}\frac{3}{3} + \frac{11}{12} = \frac{9}{12} + \frac{11}{12} = \frac{9 + 11}{12} = \frac{20}{12} = \frac{5 \cdot 4}{3 \cdot 4} = \frac{5 \cdot \cancel{4}}{3 \cdot \cancel{4}} = \frac{5}{3}$$

(c)
$$\frac{11}{25} + \frac{8}{20} = \frac{11}{25} \cdot \frac{4}{4} + \frac{8}{20} \cdot \frac{5}{5} = \frac{44}{100} + \frac{40}{100} = \frac{44 + 40}{100} = \frac{84}{100} = \frac{21 \cdot 4}{25 \cdot 4} = \frac{21 \cdot \cancel{4}}{25 \cdot \cancel{4}} = \frac{21}{25}$$

(d)
$$-\frac{6}{5} + \frac{7}{11} = -\frac{6}{5} \cdot \frac{11}{11} + \frac{7}{11} \cdot \frac{5}{5} = -\frac{66}{55} + \frac{35}{55} = \frac{-66 + 35}{55} = -\frac{31}{55}$$

(e)
$$\frac{1}{3} - \frac{5}{7} + \frac{13}{12} = \frac{1}{3} \cdot \frac{28}{28} - \frac{5}{7} \cdot \frac{12}{12} + \frac{13}{12} \cdot \frac{7}{7} = \frac{28}{84} - \frac{60}{84} + \frac{91}{84} = \frac{28 - 60 + 91}{84} = \frac{59}{84}$$

Problem 3. (10pt) Showing all your work and simplifying as much as possible, compute the following:

(a) $\dfrac{\frac{5}{6}}{\frac{15}{12}}$

(b) $\dfrac{\frac{11}{7}}{\frac{33}{35}}$

(c) $\dfrac{\frac{3}{4}}{\frac{8}{9}}$

(d) $\dfrac{\frac{25}{18}}{\frac{6}{15}}$

(e) $\dfrac{\frac{5}{7}}{\frac{11}{13}}$

Solution.

(a)

$$\frac{\frac{5}{6}}{\frac{15}{12}} = \frac{5}{6} \cdot \frac{12}{15} = \frac{\cancel{5}^{\,1}}{\cancel{6}^{\,1}} \cdot \frac{\cancel{12}^{\,2}}{\cancel{15}^{\,3}} = \frac{1}{1} \cdot \frac{2}{3} = \frac{2}{3}$$

(b)

$$\frac{\frac{11}{7}}{\frac{33}{35}} = \frac{11}{7} \cdot \frac{35}{33} = \frac{\cancel{11}^{\,1}}{\cancel{7}^{\,1}} \cdot \frac{\cancel{35}^{\,5}}{\cancel{33}^{\,3}} = \frac{1}{1} \cdot \frac{5}{3} = \frac{5}{3}$$

(c)

$$\frac{\frac{3}{4}}{\frac{8}{9}} = \frac{3}{4} \cdot \frac{9}{8} = \frac{27}{32}$$

(d)

$$\frac{\frac{25}{18}}{\frac{6}{15}} = \frac{25}{18} \cdot \frac{15}{6} = \frac{25}{18} \cdot \frac{\cancel{15}^{\,5}}{\cancel{6}^{\,2}} = \frac{25}{18} \cdot \frac{5}{2} = \frac{125}{36}$$

(e)

$$\frac{\frac{5}{7}}{\frac{11}{13}} = \frac{5}{7} \cdot \frac{13}{11} = \frac{65}{77}$$

Problem 4. (10pt) Convert the following given mixed numbers to an improper fraction or convert the given improper fraction to a mixed number:

(a) $5\frac{3}{5}$

(b) $-\frac{19}{5}$

(c) $11\frac{2}{3}$

(d) $\frac{56}{11}$

(e) $-2\frac{5}{6}$

Solution.

(a)
$$5\frac{3}{5} = \frac{5\cdot 5 + 3}{5} = \frac{25 + 3}{5} = \frac{28}{5}$$

(b) We have...

$$5\overline{)\,19\,}^{\,3}$$
$$\underline{15}$$
$$4$$

But then we have...

$$-\frac{19}{5} = -3\frac{4}{5}$$

(c)
$$11\frac{2}{3} = \frac{3\cdot 11 + 2}{3} = \frac{33 + 2}{3} = \frac{35}{3}$$

(d) We have...

$$11\overline{)\,56\,}^{\,5}$$
$$\underline{55}$$
$$1$$

But then we have...

$$\frac{56}{11} = 5\frac{1}{11}$$

(e)
$$-2\frac{5}{6} = -\frac{6\cdot 2 + 5}{6} = -\frac{12 + 5}{6} = -\frac{17}{6}$$