۳- اگر $M = \frac{1+\frac{5}{2}}{1-\frac{3}{2}}$ باشد، حاصل هریک از عبارت های زیر را بدست آورید. $M = -7$

$N = \frac{-M^{-1}+1}{1-M} \Rightarrow N = \frac{-(-7)^{-1}+1}{1-(-7)} = \frac{\frac{1}{7}+1}{1+7} = \frac{\frac{1}{7}+\frac{7}{7}}{8} = \frac{\frac{8}{7}}{8} = \frac{1\times 8}{7\times 8} = \boxed{\frac{1}{7}}$

$L = \frac{2N-M}{MN} \Rightarrow L = \frac{2\times\frac{1}{7}-(-7)}{-7\times\frac{1}{7}} = \frac{\frac{2}{7}+7}{-7} = \frac{\frac{2}{7}+\frac{49}{7}}{-7} = \boxed{-\left(\frac{51}{7}\right)}$

$K = \frac{L\div M}{N+L} \Rightarrow K = \frac{-\left(\frac{51}{7}\right)\div(-7)}{\frac{1}{7}+\left(-\left(\frac{51}{7}\right)\right)} = \frac{-\frac{51}{7}\times\frac{1}{-7}}{\frac{1}{7}-\frac{51}{7}} = \frac{\frac{51}{49}}{-\frac{50}{7}} = \frac{51}{49}\times\frac{7}{-50} = \frac{51}{-350} = \boxed{\frac{51}{350}}$

۴- کسرهای زیر را مقایسه کرده و از کوچک به بزرگ مرتب نمایید.

الف) $\frac{2}{7} < \frac{1}{3} < \frac{4}{9} < \frac{4}{7} < \frac{3}{5} < \frac{2}{3} < \frac{7}{9} < \frac{4}{7} \Rightarrow \frac{7}{9} > \frac{2}{3} > \frac{3}{5} > \frac{4}{7} > \frac{4}{9} > \frac{1}{3} > \frac{2}{7}$ و $\frac{3}{5}$ و $\frac{1}{3}$ و $\frac{4}{9}$ و $\frac{2}{3}$ و $\frac{7}{9}$ و $\frac{4}{7}$

ب) $-2\frac{15}{36} < -2\frac{1}{2} < -2\frac{13}{24} < -\frac{6}{8} \Rightarrow -\frac{1}{2}$ و $-\frac{15}{36}$ و $-\frac{13}{24}$ و $-\frac{6}{8}$ و $\frac{-4}{9}$

۵- کسرهای زیر را ساده کنید.

الف) $\frac{\frac{15}{-11}\times 142}{-213\times\frac{5}{-22}} = \frac{\frac{15}{-11}\times\frac{142}{1}}{\frac{-213}{1}\times\frac{5}{-22}} = \frac{15\times 142}{-11\times(-213)\times 5} = \frac{2\times 3\times 142}{-213} = \frac{2\times 142}{-71} = -\frac{4}{1} = \boxed{-4}$

ب) $\frac{-57\times 42}{28\times(-45)} \div \frac{19}{-14} = \frac{-57\times 42}{28\times(-45)} \div \frac{19}{-14} = \frac{-19}{14\times(-1)} \times \frac{-14}{19} = \frac{-1\times(-2)}{-2} = \boxed{-1}$

ج) $\frac{0/017\times(-125)}{\frac{85}{-24}\times 0/1} = \frac{0/017\times(-125)}{\frac{85}{-24}\times\frac{0/1}{1}} = \frac{-24\times 0/017\times(-125)}{85} = \frac{-24\times 0/017\times(-125)}{17\times 0/1} = \frac{-6\times(-25)}{100} = \boxed{6}$

د) $\frac{-\frac{28}{17}\times 120\times(-51)\times 13}{(-801)\times 24\times 57} = \frac{-28\times 120\times(-51)\times 13}{17\times(-801)\times 24\times 57} = \frac{-28\times 120\times(-3)}{-267\times 24\times 57} = \frac{-19\times(-3)}{-2\times 57} = \frac{-2\times(-1)}{4} = -1$

ه) $\frac{-14}{29}\times\frac{87}{-12}\times\frac{-9}{22} = \frac{-2}{29}\times\frac{87}{-12}\times\frac{-9}{3} = -2\times\frac{3}{-4}\times\frac{-9}{4} = -2\times\frac{1}{4}\times 3 = -1\frac{1}{2}\times 3 = -\frac{3}{2}$

فصل اول: اعداد صحیح و گویا

تمرین سری ۲ (از سئوال ۶)

۶- حاصل عبارت های زیر را بدست آورید.

الف)
$$\frac{\left(\frac{5}{9}+\frac{1}{3}\right)\times 6\frac{4}{4}}{\left(\frac{2}{25}+\frac{7}{5}\right)\div\frac{8}{10}}=\frac{\left(\frac{5}{9}+\frac{3}{9}\right)\times\frac{27}{4}}{\left(\frac{2}{25}+\frac{35}{25}\right)\div\frac{8}{10}}=\frac{\frac{8}{9}\times\frac{27}{4}}{\frac{37}{25}\times\frac{10}{8}}=\frac{2\times 3}{\frac{37}{5}\times\frac{5}{8}}=\frac{6}{\frac{37}{8}}=\frac{5\times 4\times 6}{37}=\boxed{\frac{120}{37}}$$

ب)
$$\frac{6\frac{1}{10}\div\left(\frac{3}{5}+1\frac{1}{7}\right)}{\left(2\frac{4}{5}-1\frac{1}{2}\right)\div\left(\frac{2}{9}+\frac{5}{18}\right)}=\frac{\frac{61}{10}\div\left(\frac{3}{5}+\frac{8}{7}\right)}{\left(\frac{14}{5}-\frac{3}{2}\right)\div\left(\frac{4}{18}+\frac{5}{18}\right)}=\frac{\frac{61}{10}\div\left(\frac{21+40}{35}\right)}{\left(\frac{28-15}{10}\right)\div\frac{9}{18}}=$$

$$\frac{\frac{61}{10}\div\frac{61}{35}}{\frac{13}{5}\times\frac{1}{2}}=\frac{\frac{61}{10}\times\frac{35}{61}}{\frac{13}{5}}=\frac{\frac{7}{2}}{\frac{13}{5}}=\frac{5\times 7}{13\times 2}=\frac{35}{26}=1\frac{9}{26}$$

ج)
$$\frac{5\frac{1}{8}-2\frac{15}{32}}{3\frac{7}{12}-2\frac{3}{4}}\div\frac{\frac{1}{4}-\frac{1}{9}}{\frac{1}{2}+\frac{1}{3}}=\frac{5\frac{1}{8}-2\frac{5}{8}}{1\frac{6}{12}}\div\frac{\frac{9-4}{36}}{\frac{3+2}{6}}=\frac{\frac{41}{8}-\frac{21}{8}}{1\frac{1}{2}}\div\frac{\frac{5}{36}}{\frac{5}{6}}=\frac{\frac{20}{8}}{\frac{3}{2}}\div\frac{1}{6}=\frac{\frac{5}{2}}{\frac{3}{2}}\times\frac{6}{1}=\boxed{10}$$

د)
$$\frac{\left(2\frac{3}{5}+3\frac{2}{5}\right)\div\left(\frac{4}{7}\times\frac{14}{3}\right)}{\left(\frac{5}{12}-\frac{2}{9}\right)-\left(\frac{13}{36}-\frac{4}{9}\right)}=\frac{6\div 2}{\left(\frac{15-8}{36}\right)-\left(\frac{16-13}{36}\right)}=\frac{3}{\frac{7}{36}-\frac{3}{36}}=\frac{3}{\frac{4}{36}}=\frac{3\times 36}{4}=\boxed{27}$$

ه)
$$\frac{1+\frac{1}{2}+\frac{\frac{1}{2}}{1+\frac{1}{3}}}{1+\frac{1}{3}+\frac{\frac{1}{2}}{1-\frac{1}{2}}}=\frac{1\frac{1}{2}+\frac{\frac{1}{2}}{\frac{4}{3}}}{1\frac{1}{3}+\frac{\frac{1}{2}}{\frac{1}{2}}}=\frac{\frac{3}{2}+\frac{3}{4}}{\frac{4}{3}+1}=\frac{\frac{6+3}{4}}{\frac{7}{3}}=\frac{\frac{9}{4}}{\frac{7}{3}}=\frac{3}{8}+\frac{9}{28}=\frac{11}{6}$$

$$\frac{\frac{12+3}{8}}{\frac{11}{6}}=\frac{\frac{15}{8}}{\frac{11}{6}}=\frac{6\times 15}{11\times 8}=\boxed{\frac{45}{44}}=\boxed{1\frac{1}{44}}$$

ج) $$\frac{\frac{(-5)\times 24}{21\times(-63)}}{\frac{-17\times(-30)}{49\times(-27)}}=\frac{-5\times 24\times 49\times(-27)}{21\times(-63)\times(-17)\times(-30)}=\frac{8\times 7\times(-27)}{7\times(-9)\times(-17)\times 6}=\frac{4\times 3}{-17\times 3}=\boxed{\frac{4}{-17}}$$

ج) $$1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{2-3-4}}}}=1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{-5}}}}=1-\cfrac{1}{1-\cfrac{1}{1-\cfrac{1}{\frac{6}{5}}}}=1-\cfrac{1}{1-\cfrac{1}{1-\frac{5}{6}}}=$$

$$1-\cfrac{1}{1-\cfrac{1}{\frac{1}{6}}}=1-\cfrac{1}{1-\frac{6}{1}}=1-\frac{1}{-5}=1+\frac{1}{5}=\boxed{1\frac{1}{5}}=\boxed{\frac{6}{5}}$$

د) $$\left(1+\frac{1}{2}\right)^2\left(1-\frac{1}{2}\right)^2\left(1+\frac{1}{3}\right)^2\left(1-\frac{1}{3}\right)^2\cdots\left(1+\frac{1}{100}\right)^2\left(1-\frac{1}{100}\right)^2=$$

$$\frac{3}{2}\times\frac{3}{2}\times\frac{1}{2}\times\frac{1}{2}\times\frac{4}{3}\times\frac{4}{3}\times\frac{2}{3}\times\frac{2}{3}\times\frac{5}{4}\times\frac{5}{4}\times\frac{3}{4}\times\frac{3}{4}\times\cdots\times\frac{101}{100}\times\frac{101}{100}\times\frac{99}{100}\times\frac{99}{100}=$$

$$\frac{1}{2}\times\frac{1}{2}\times 101\times 101\times\frac{1}{100}\times\frac{1}{100}=\frac{101^2}{(100\times 2)^2}$$

۷- حاصل عبارت $\frac{5}{6}+\frac{301}{900}-\frac{513}{511}+\frac{1023}{2048}$ تقریبا چند است؟

$$\frac{1024}{2048}+\frac{513}{512}-\frac{300}{900}+\frac{6}{6}=$$

$$\frac{1}{2}+1-\frac{1}{3}+1=2\frac{1}{2}-\frac{1}{3}=\frac{4}{2}-\frac{1}{3}=\frac{24-2}{6}=\frac{23}{6}=3\frac{4}{6}=\boxed{3\frac{2}{3}}$$

۸- کوچکترین عدد طبیعی که اگر آن را بر $\frac{9}{5}$ و $\frac{9}{35}$ و $\frac{6}{25}$ تقسیم کنیم، خارج قسمت صحیح باشد چیست؟

$$x\times\frac{25}{6}\times\frac{35}{9}\times\frac{5}{9}=\text{خارج قسمت صحیح}\Rightarrow x=\frac{1}{629}\Rightarrow x=\boxed{\frac{1}{18}}$$

۹- ۶ کسر بین $\frac{1}{2}$ و $\frac{1}{3}$ نام ببرید که مخرج آن ۴۰ باشد.

$\frac{1}{3}=\frac{2}{6}=\frac{13.33}{40}$ و $\frac{1}{2}=\frac{3}{6}=\frac{20}{40}$ پس $\Rightarrow$ $\frac{14}{40}$ و $\frac{15}{40}$ و $\frac{16}{40}$ و $\frac{17}{40}$ و $\frac{18}{40}$ و $\frac{19}{40}$