SOLUTIONS

→ x 10^-1
← x 10^41

Review Questions for Midterm Exam

Use the order of operations to simplify the following expression

1. $\dfrac{[-8-(|-4|\times 8\div 16)][-15-(\sqrt{64}\div -2)]}{(43-40)^3-2^4\div 4}$

$\dfrac{[-8-(4\times 8\div 16)][-15-(8\div -2)]}{(3)^3-16\div 4}$

$\dfrac{[8-(32\div 16)][-15-(-4)]}{27-4}$

$\dfrac{[-8-2][-15+4]}{23}$

$\dfrac{[-10][-11]}{23}$

$\dfrac{110}{23}$

Solve the following expressions

2. $\dfrac{10^{-23}\times 10^{-16}\times 10^{31}}{10^{17}\times 10^{13}\times 10^{-27}}$

$\dfrac{10^{-23-16+31}}{10^{17+13-27}} = \dfrac{10^{-8}}{10^3} = \dfrac{1}{10^{3+8}} = \dfrac{1}{10^{11}}$

$\dfrac{\left(\frac{10^{16}}{10^{-25}}\right)^{-6}}{\left(\frac{10^{-18}}{10^{22}}\right)^3} = \dfrac{(10^{16+25})^{-6}}{(10^{-18-22})^3}$

$\dfrac{(10^{41})^{-6}}{(10^{-40})^3} = \dfrac{10^{-246}}{10^{-120}}$

$\dfrac{1}{10^{126}}$

3. $\dfrac{18\times 12\times 10^6}{27\times 10^4+(8.2\times 10^2)^3}$

$\dfrac{216\times 10^6}{27\times 10^4+(8.2)^3\times(10^2)^3}$

$\dfrac{216\times 10^6}{27\times 10^4+551.368\times 10^6} = \dfrac{216\times 10^6}{0.27\times 10^4\cdot 10^2+551{,}368\times 10^6} = \dfrac{216\times 10^6}{551{,}638\times 10^6}$

$0.3915 = 3.9\times 10^{-1}$

4. $\dfrac{1}{6.280\times10^{2}}+\dfrac{1}{5160}-\sqrt{9720}$

$\frac{1}{6.280}\times\frac{1}{10^2}+\frac{1}{5.160}\times\frac{1}{10^3}-(\sqrt{9.720})(\sqrt{10^3})$

$0.15923\times10^{-2}+0.1938\times10^{-3}-3.1177\times31.6227$

$0.15923\times10^{-2}+0.01938\times10^{-3}\times10^{+1}-98.59009$

$0.15923\times10^{-2}+0.01938\times10^{-2}-98.59009 = -98.588$

-9.859×10^{1}

5. $\dfrac{1}{\frac{1}{7500}-\frac{1}{5600}+\frac{1}{3300}}$

$\frac{1}{0.0001333-0.00017857+0.00030303}$

$\frac{1}{0.00025776} = 3879.577 = 3.880\times10^{3}$

Convert to the following units, final answers should be in scientific notation

4.17×10^{-4}

6. 0.000417 A = 4.17×10^{-1} mA = 4.17×10^{2} µA

7. 34.7 mL/km = 1.34×10^{-4} cups/yard = 8.81×10^{-16} GL/inch

$\left(\frac{4.17\times10^{-4}\,A}{1}\right)\left(\frac{1\,mA}{10^{-3}A}\right)=\frac{4.17\times10^{-4}\,mA}{10^{-3}}$

$\left(\frac{4.17\times10^{-4}\,A}{1}\right)\left(\frac{1\,\mu A}{10^{-6}A}\right)=\frac{4.17\times10^{-4}\,\mu A}{10^{-6}}$

$\left(\frac{34.7\,mL}{km}\right)\left(\frac{1.609\,km}{1\,mile}\right)\left(\frac{1\,mile}{1760\,yds}\right)\left(\frac{1\,teaspoon}{4.93\,mL}\right)\left(\frac{1\,tablespoon}{3\,teaspoon}\right)\left(\frac{1\,cup}{16\,tablespoon}\right)=\frac{34.7\times1.609}{1760\times4.93\times3\times16}=1.34\times10^{-4}$

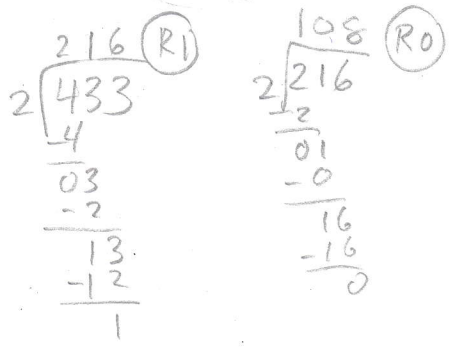
$\left(\frac{34.7\,mL}{km}\right)\left(\frac{10^{-3}L}{1\,mL}\right)\left(\frac{1\,GL}{10^{9}L}\right)\left(\frac{1.609\,km}{1\,mile}\right)\left(\frac{1\,mile}{5280\,feet}\right)\left(\frac{1\,foot}{12\,inches}\right)=\frac{34.7\times1.609\times10^{-3}}{12\times5280\times10^{9}}=8.81\times10^{-16}$

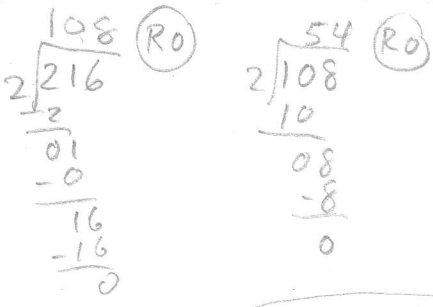
Convert the following

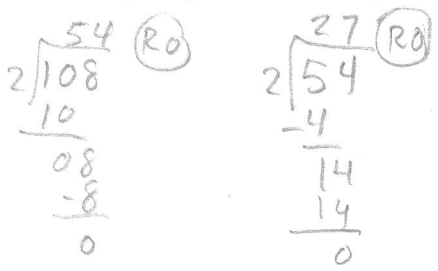
Decimal Number	Scientific Notation
0.000008601	8.601×10^{-6}
0.000000571	5.71×10^{-7}

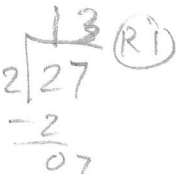
9. Fill in the following table by converting the known numbers

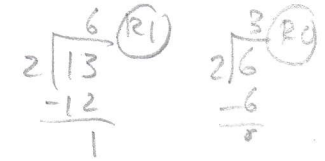
Decimal (Base 10)	Binary (Base 2)	Octal (Base 8)	Hexadecimal (Base 16)
433_{10}	110110001_2	661_8	$1B_{16}$
38_{10}	100110_2	46_8	26_{16}
117_{10}	001110101_2	165_8	075_{16}
1004_{10}	$0011\ 1110\ 1100_2$	1754_8	$3EC_{16}$

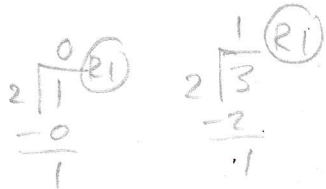








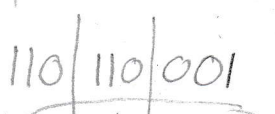




$11011000\,1_2$

$0001\ 1011\ 0001$

$1\ B\ 1_{16}$



$110\ 110\ 001$

$6\ 6\ 1_8$

$26_{16} \rightarrow 2 \cdot 16^1 + 6 \times 16^0$

$2 \cdot 16 + 6 \cdot 1 = 38_{10}$

$100\ 110$

$4\ 6_8$

$0010\ 0110$

$2\ 6_{16}$

$075_{16} \rightarrow 0 \cdot 16^2 + 7 \times 16^1 + 5 \times 16^0$

$0 + 7 \cdot 16 + 5 \times 1 = 117_{10}$

$0000\ 0111\ 0101$

$0\ 7\ 5_{16}$

165_8

$001\ 110\ 101_2$

$3EC_{16} \rightarrow 3 \cdot 16^2 + E \cdot 16^1 + C \cdot 16^0$

$3 \cdot 256 + 14 \cdot 16 + 12 \cdot 1 =$

$768 + 224 + 12 = 1004_{10}$

$3\ E\ C$

$0011\ 1110\ 1100_2$

$001\ 111\ 101\ 100$

$1\ 7\ 5\ 4_8$

A=10, B=11, C=12, D=13, E=14, F=15

Compute the following in the given base

10. $71456_8 + 20317_8$

$$\begin{array}{r} 71456_8 \\ +\ 20317_8 \\ \hline 111775_8 \end{array}$$

11. $A3B92F_{16} + 83CD0E_{16}$

$$\begin{array}{r} A3B92F_{16} \\ +\ 83CD0E_{16} \\ \hline 127863D_{16} \end{array}$$

12. $1100011_2 + 1011011_2$

$$\begin{array}{r} 1100011_2 \\ +\ 1011011_2 \\ \hline 10111110_2 \end{array}$$

13. $101110_2 \div 101_2$

$$\begin{array}{r} 1001 \text{ R1} \\ 101 \overline{)\ 101110} \\ -\ 101 \\ \hline 0001 \\ -\ 000 \\ \hline 011 \\ -\ 000 \\ \hline 110 \\ -\ 101 \\ \hline 1 \end{array}$$

14. $732540_8 - 164273_8$

$$\begin{array}{r} 732540_8 \\ -\ 164273_8 \\ \hline 546245_8 \end{array}$$

15. $8C90A3_{16} - 231A79_{16}$

$$\begin{array}{r} 8C90A3_{16} \\ -\ 231A79_{16} \\ \hline 697629_{16} \end{array}$$

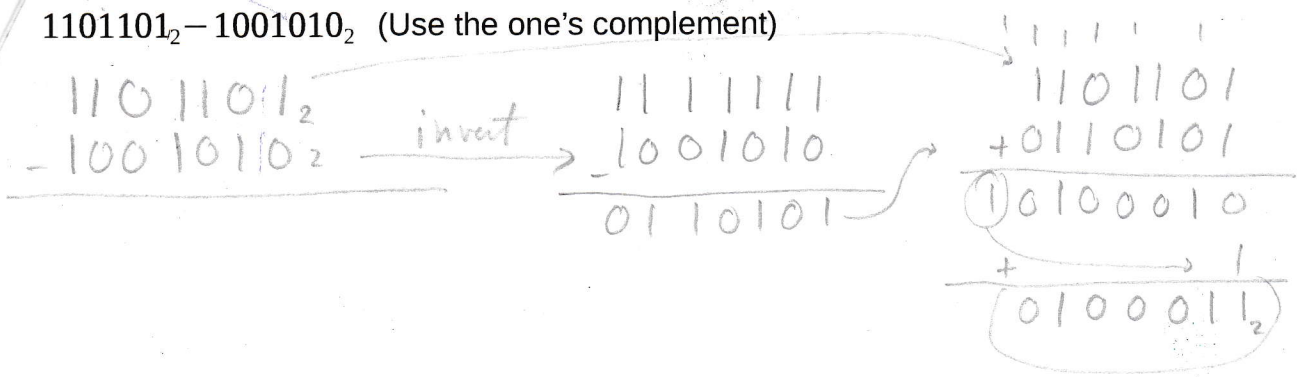
16. $1110011_2 - 0101101_2$

$$\begin{array}{r} 1110011_2 \\ -\ 0101101_2 \\ \hline 1000110_2 \end{array}$$

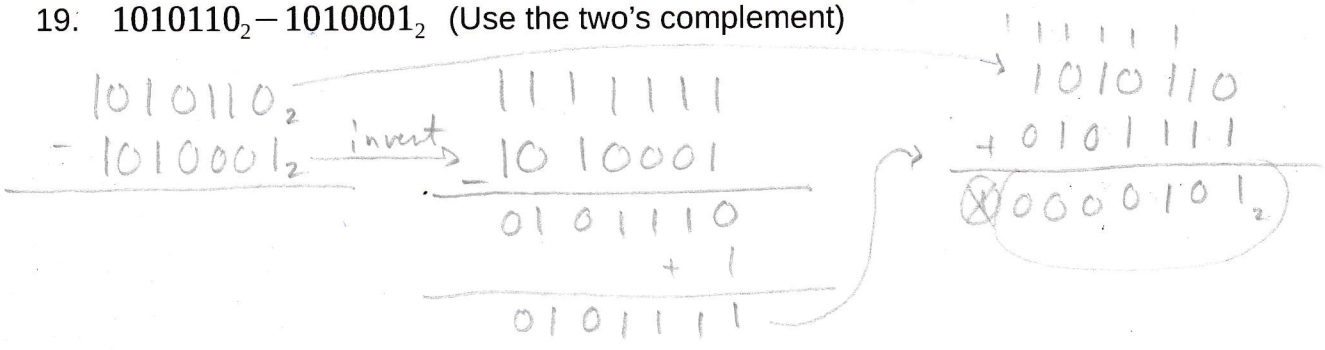
17. $1010110_2 \times 1011_2$

$$\begin{array}{r} 1010110 \\ \times\ 1011 \\ \hline 1010110 \\ 1010110\circ \\ 0000000\circ\circ \\ +\ 1010110\circ\circ\circ \\ \hline 1101100102 \end{array}$$

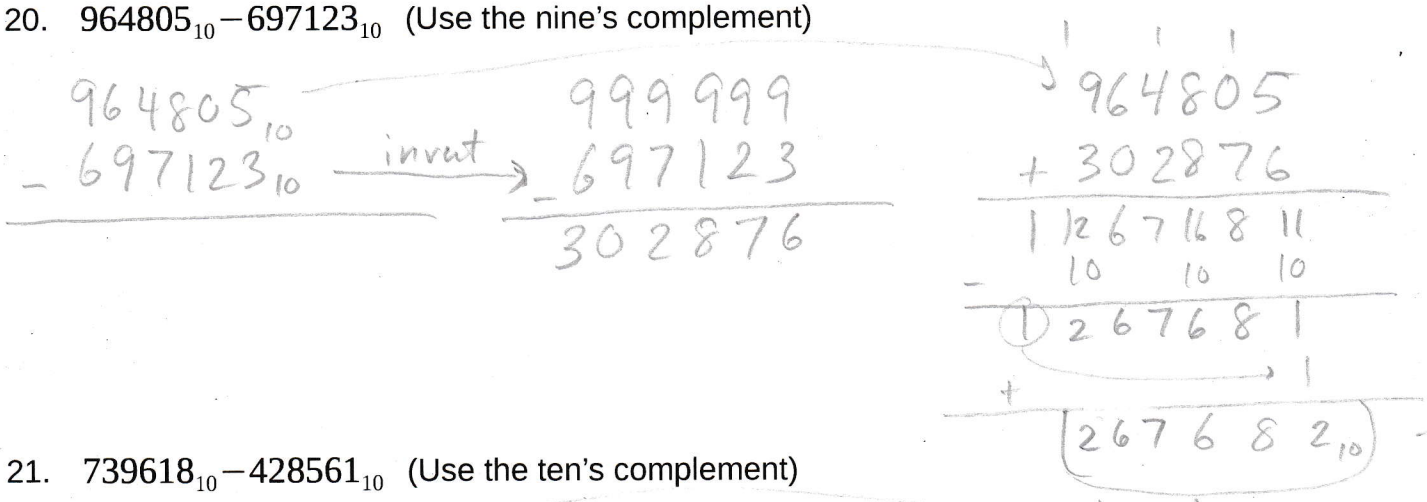
$1101101_2 - 1001010_2$ (Use the one's complement)



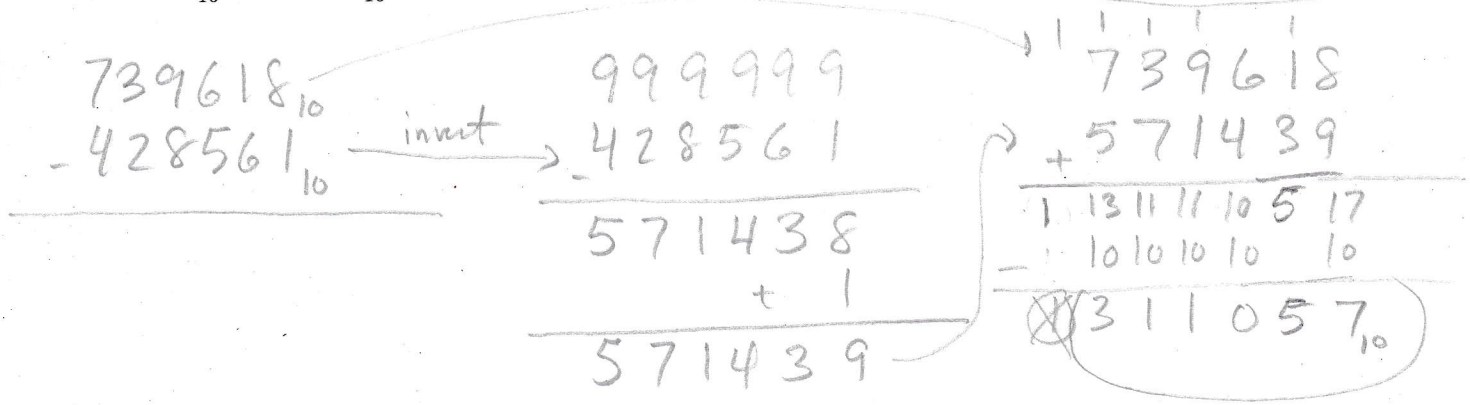
19. $1010110_2 - 1010001_2$ (Use the two's complement)



20. $964805_{10} - 697123_{10}$ (Use the nine's complement)



21. $739618_{10} - 428561_{10}$ (Use the ten's complement)



Also questions on conversion between percent and decimal, rounding, significant figures, scientific notation, powers of 10...will be in multiple choice format.