MATH1040/7040 ASSIGNMENT 1, Semester 1, 2011 **SOLUTIONS**

1. At least six lines.

2. (a)

$$\begin{aligned}
\left(\frac{10}{8} - \frac{-32}{-40} + \frac{-31}{40}\right) \times \frac{-32}{-48} &= \left(\frac{10\times 5}{8\times 5} - \frac{32}{40} + \frac{-31}{40}\right) \times \frac{-32}{-48} \\
&= \left(\frac{50-32}{40} + \frac{-31}{40}\right) \times \frac{-32}{-48} \\
&= \left(\frac{18}{40} + \frac{-31}{40}\right) \times \frac{-32}{-48} \\
&= \left(\frac{\cancel{2}\times 9}{\cancel{2}\times 20} + \frac{-31}{40}\right) \times \frac{-32}{-48} \\
&= \left(\frac{9}{20} + \frac{-31}{40}\right) \times \frac{-32}{-48} \\
&= \left(\frac{9\times 2}{20\times 2} - \frac{31}{40}\right) \times \frac{-32}{-48} \\
&= \frac{18-31}{40} \times \frac{-32}{-48} \\
&= \frac{-13}{40} \times \frac{-32}{-48} \\
&= \frac{-13}{\cancel{2}\times 20} \times \frac{\cancel{16}\times \cancel{2}}{\cancel{16}\times 3} \\
&= \frac{-13}{20} \times \frac{1}{3} \\
&= \frac{-13\times 1}{20\times 3} \\
&= \frac{-13}{60} \\
&= -\frac{13}{60}
\end{aligned}$$

(b)

$$\begin{aligned}
y^3 \times x^2y^3x^{-1}y^1 \div x^2 &= y^3 \times x^2y^3x^{-1}y^1 \times x^{-2} \\
&= x^2x^{-1}x^{-2}y^3y^3y^1 \\
&= x^{2-1-2}y^{3+3+1} \\
&= x^{-1}y^7
\end{aligned}$$

(c) $(6-6x)(-3x) = 6\times(-3x) - 6x\times(-3x) = -18x + 18x^2$ (OR $+18x^2 - 18x$)

(d) $(4+x)(-6+5x) = 4\times(-6) + 4\times 5x + x\times(-6) + x\times 5x = -24 + 20x - 6x + 5x^2 = 5x^2 + 14x - 24$

(e) $-4 = \frac{4x}{5} - 5$, so $\frac{4x}{5} = -4+5$, so $\frac{4x}{5} = 1$, so $4x = 1\times 5$, so $4x = 5$, so $\frac{4x}{4} = \frac{5}{4}$

Hence solution is: $x = \frac{5}{4}$

(f) $\frac{-3}{-2y} + 6 = 5$, so $\frac{3}{2y} = -6+5$, so $\frac{3}{2y} = -1$, so $3 = -1\times 2y$, so $3 = -2y$, so $y = \frac{3}{-2}$

Hence solution is: $y = -\frac{3}{2}$

3. There may be multiple answers for each question.

(a) $-4 = 4 - 2 \times 4$

(b) $5 \div (10 \div 2) = 1$

(c) $6 + 2 \times 3 + 4 = 16$

4. Evaluate the following:

(a) $5 \times \sqrt{55 - 30 \div 5} - 4^3 \div 8$
$= 5 \times \sqrt{55 - 6} - 64 \div 8$
$= 5 \times \sqrt{49} - 8$
$= 27$

(b) $45 + 5 \times \dfrac{(2^3 + 2^2) \times 3^2}{5^3 - (3 + 2)}$

$= 45 + 5 \times \dfrac{(8 + 4) \times 9}{125 - 5}$

$= 45 + 5 \times \dfrac{12 \times 9}{120}$

$= 45 + 5 \times \dfrac{9}{10}$

$= 45 + \dfrac{45}{10}$

$= 49.5$

(c) $(45 \times 3^{-2} + \sqrt{25})^{-3} \times 10^5 \div 2^2$

$= (45 \times \dfrac{1}{3^2} + 5)^{-3} \times 100000 \div 4$

$= (5 + 5)^{-3} \times 100000 \div 4$

$= (10)^{-3} \times 100000 \div 4$

$= \dfrac{1}{10^3} \times 100000 \div 4$

$= \dfrac{1}{1000} \times 100000 \div 4$

$= 100 \div 4$
$= 25$

5. Choice of size of jug is personal. Let's use 1L. A normal party balloon blown up is approximately 30cm $\times$ 30cm$\times$ 30cm. That's 27000cm^3 if we consider the balloon as a cube. This is a bit of an overestimate. 1cm^3=1mL so we need about 27000mL or 27L or 27 jugs. A balloon might take up a half or two-thirds of a 30cm $\times$ 30cm$\times$ 30cm box, so perhaps it's 13.5 jugs or 18 jugs.

If we consider the balloon as a sphere we could use $V = \frac{4}{3}\pi r^3$. This would give us $V = \frac{4}{3}\pi 15^3$ as half of 30 is 15. This gives us about 14 jugs.

6. Let x be the number of three-legged stools and y be the number of four-legged stools. So $3x + 4y = 37$. We have one equation but two unknowns so there is no unique solution. However, $x = 7, y = 4$ is one solution. $x = 11, y = 1$ is another. $x = 3, y = 7$ is the only other solution. Can you spot a pattern?