Practice for L3 Equations #4

1. Solve the system of equations

$x + 2z = 14 + y$ $\qquad$ $3x + 4y = 2z - 12$ $\qquad$ $2x + 2y + 3z - 15 = 0$

2. Four entrées, four main courses and four desserts cost $280.

   Three entrées, three mains and two desserts cost $195.

   Three entrées cost the same as four desserts.

   What does a dessert cost?

3. Mum, dad and child add up to 80 years old.

   Dad is nine times as old as the child.

   Dad is ten years older than the mum and child added together.

   How much older is the dad than the mum?

4. Bill gets paid $1,352 for forty hours standard time and ten hours overtime, with four hours extra callout bonus.

   The next week he gets $1,224 for forty hours standard, six hours overtime and six hours bonus.

   If overtime is half as much again as standard time, how much is it?

5. Describe fully the nature of the system of equations below:

$4c + b + 4d = 53$ $\qquad$ $2c + 6b + 6d = 86$ $\qquad$ $10c + 8b + 14d = 192$

6. Solve the following system of equations as much as possible:

$a + b + c + d = 28$ $\qquad$ $2a - b + 2c + d = 14$ $\qquad$ $a - b + c + 2d = 15$

Answers: Practice for L3 Equations #4

1. $x = 2, y = -2, z = 5$

2. $4e + 4m + 4d = 280$ $\quad$ $4e + 4m + 4d = 280$

   $3e + 3m + 2d = 195$ $\quad$ $3e + 3m + 2d = 195$

   $3e = 4d$ $\quad$ $3e - 4d = 0$

   $e = 20$, $m = 35$, $d = 15$. Must answer question asked in context. **A dessert costs $15**.

3. $d + m + c = 80$ $\quad$ $d + m + c = 80$

   $d = 9c$ $\quad$ $d - 9c = 0$

   $d + m + c + 10$ $\quad$ $d - m - c = 10$

   $d = 45$, $m = 30$, $c = 5$. **Dad is 15 years older than the mum.**

4. $40s + 10o + 4b = 1352$ $\quad$ $40s + 10o + 4b = 1352$

   $40s + 6o + 6b = 1224$ $\quad$ $40s + 6o + 6b = 1224$

   $o = 1.5s$ $\quad$ $1.5s - o = 0$

   $s = 24$, $o = 36$, $b = 8$. Must answer question asked in context. **Overtime is $36 an hour**.

5. ① $4c + b + 4d = 53$ $\quad$ ② $2c + 6b + 6d = 86$ $\quad$ ③ $10c + 8b + 14d = 192$

   taking 2① + 1② – 1③ gives the equation: 0 = 0 so the system is **dependent**.

   There are an **infinite number of solutions**. All three **planes** mutually **intersect along a common line**.

6. $a + b + c + d = 28$ $\quad$ $(a + c) + b + d = 28$ $\quad$ $k + b + d = 28$

   $2a - b + 2c + d = 14$ $\quad$ $2(a + c) - b + d = 14$ $\quad$ $2k - b + d = 14$

   $a - b + c + 2d = 15$ $\quad$ $(a + c) - b + 2d = 15$ $\quad$ $k - b + 2d = 15$

   $k = a + c = 8$, $b = 11$, $d = 9$ $\quad$ **No solution is possible for a and c separately**