Tutorial answer sheet – Linear systems

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1. (a) $(x, y) = (-3, -3)$;
   (b) $(r, s, t) = (-1, 0, -2)$;
   (c) $(x, y, z) = (0, 0, 0)$;
   (d) $(\alpha, \beta, \gamma) = (-1, 4, -7)$.
2. (a) $(x, y) = (4, -5)$;
   (b) $(f, g, h) = (1, 1, -1)$.
3. (a) $(i, j, k) = (3, 1, 2)$;
   (b) $(u, v, w) = (-\frac{1}{7} - \frac{3}{7}t, \frac{1}{7} - \frac{4}{7}t, t)$;
   (c) inconsistent;
   (d) $(w, x, y, z) = (t - 1, 2s, s, t)$.
4. (a) $(a, b) = (0.609, -0.739)$;
   (b) $(\theta, \phi, \zeta) = (1, 2, -3)$.
5. Both (a) and (b) have zero determinant, thus neither pair of equations has a unique solution. The explanations:
   (a) These equations represent parallel lines, they never cross;
   (b) These equations represent the same line, they intersect completely.