# MATH 2130 Problem Workshop 1

In questions 1-12, draw the surface defined by the question. In questions 13-16, draw the curve and find the projections in the $xy$, $yz$ and $xz$-coordinate planes.

1. $x = 2y^2 + z^2$
2. $z = 2xy$
3. $z = |x + y|$
4. $x = z^3 + 1$
5. $|x| + |y| = 1$
6. $z^2 - x^2 = 3y^2$
7. $y^2 = z^2 - 2y + 3$
8. $x^2 + y^2 = 2x - 4y - 5$
9. $4y^2 + z^2 = x^2 - 1$
10. $4y^2 + z^2 = x^2 + 1$
11. $2x^2 + 3y^2 + 4z^2 = 12$
12. $y^2 + 2z^2 = 4 - 2x$
13. (The intersection of) $z = 2x^2 + 4y^2, \quad y + z = 1.$
14. (The intersection of) $x^2 + y^2 + 2z^2 = 2, \quad x + y = 1.$
15. (The intersection of) $z = x^2 + y^2, \quad z = 2x^2.$
16. (The intersection of) $z = x^2 + y^2, \quad 2z = x^2.$

**Answers:**

13.
- $2x^2 + 4y^2 + y = 1, \quad z = 0.$
- $y + z = 1, \quad x = 0$, where $(-1 - \sqrt{17})/8 \leq y \leq (-1 + \sqrt{17})/8$
- $4z^2 - 9z + 2x^2 + 4 = 0, \quad y = 0.$

14.
- $x + y = 1, \quad z = 0$, where $(1 - \sqrt{3})/2 \leq x \leq (1 + \sqrt{3})/2$
- $2y^2 - 2y + 2z^2 = 1, \quad x = 0.$
- $2x^2 - 2x + 2z^2 = 1, \quad y = 0.$

15.
- $y = \pm x, \quad z = 0.$
- $z = 2y^2, \quad x = 0.$
- $z = 2x^2, \quad y = 0.$

16.
- $(0, 0, 0)$
- $(0, 0, 0)$
- $(0, 0, 0)$