MATH 2130 Tutorial 1

In questions 1–12 draw the surface defined by the equation.

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. $y^2 + 2z^2 = 4 - 2x$

In questions 13–16 draw the curve and find equations for its projections in the xy-, yz-, and xz-coordinate planes.

13. $z = 2x^2 + 4y^2$, $y + z = 1$
14. $x^2 + y^2 + 2z^2 = 2$, $x + y = 1$
15. $z = x^2 + y^2$, $z = 2x^2$
16. $z = x^2 + y^2$, $2z = x^2$

Answers:

13. $2x^2 + 4y^2 + y = 1$, $z = 0$;
    $y + z = 1$, $x = 0$, $-(1 + \sqrt{17})/8 \le y \le (-1 + \sqrt{17})/8$;
    $4z^2 - 9z + 2x^2 + 4 = 0$, $y = 0$
14. $x + y = 1$, $z = 0$, $(1 - \sqrt{3})/2 \le x \le (1 + \sqrt{3})/2$;
    $2y^2 - 2y + 2z^2 = 1$, $x = 0$;
    $2x^2 - 2x + 2z^2 = 1$, $y = 0$;
15. $y = \pm x$, $z = 0$
    $z = 2y^2$, $x = 0$
    $z = 2x^2$, $y = 0$
16. They only intersect at the point $(0, 0, 0)$.