

- Section 15.1: 18, 20, 26, 56.
- By repeatedly completing the square, find changes of variables of the form

$$X = x + ay + b \quad Y = y + c$$

that bring the following paraboloids

$$z = x^2 + 6xy + 10y^2 + 4x + 10y + 5 \quad z = x^2 - 2xy + 4y - 4$$

into standard position. Identify them as either elliptic or hyperbolic.

- By repeatedly completing the square, determine whether the each following equations describes a cone, ellipsoid, cylinder, or hyperboloid (of how many sheets):

$$2x^2 + 2xy + 2xz + 3y^2 - 4yz + 3z^2 = 1 \quad 2x^2 - 2xz + y^2 + 2yz + z^2 = 0$$

$$2xy + y^2 + 2z^2 - 4x - 12z = 14 \quad 2xy + y^2 + 2z^2 - 4x - 12z = -25$$

- Section 13.6: 32, 36, 40, 42, 47.