## Cylinders and Quadric Surfaces

Problem 1 (Stewart, Exercises 12.6.(5,6,8)). Sketch the following surfaces.
(1) $z=1-y^{2}$;
(2) $x=z^{2}$;
(3) $z=\sin y$.

Problem 2 (Stewart, Exercises 12.6.(11,12,15,18,20)). Sketch and identify the surfaces.
(1) $x=y^{2}+4 z^{2}$;
(2) $4 x^{2}+9 y^{2}+9 z^{2}=36$;
(3) $9 y^{2}+4 z^{2}=x^{2}+36$;
(4) $3 x^{2}-y^{2}+3 z^{2}=0$;
(5) $x=y^{2}-z^{2}$.

Problem 3 (Stewart, Exercise 12.6.43). Sketch the region bounded by the surfaces $z=\sqrt{x^{2}+y^{2}}$ and $x^{2}+y^{2}=1$ for $1 \leq z \leq 2$.
Problem 4 (Stewart, Exercise 12.6.47). Find the equation of the surface consisting of all points that are equidistant from the point $(-1,0,0)$ and the plane $x=1$. Identify the surface.
Problem 5 (Stewart, Exercise 12.6.48). Find the equation of the surface consisting of all points $P$ for which the distance from $P$ to the $x$-axis is twice the distance from $P$ to the $y z$-plane. Identify the surface.

## References

[1] J. Stewart: Calculus 8th Edition, Cengage Learning, Boston 2016.

