Exercise 2.2 (Rescaling around a fixed point) Let $c \in \mathbb{R}^2$ be a center, $z \in (0, \infty)$ a zoom factor and $dz \in (0, \infty)$ a zoom scale factor. All the points are transformed from world coordinates to screen coordinates before rendering in the following way:

$$v' = z(v - c).$$

Now we assume that we have a screen point p' with world coordinates p and want to keep it fixed when changing the zoom factor from z to $dz \cdot z$. That means, we have two equations:

$$\begin{aligned} p' &= z(p - c) \\ p' &= (dz \cdot z)(p - c'), \end{aligned}$$

where c' is the new center. Resolving for c' gives us:

$$c' = p - (p - c)/dz.$$

In code, this looks as follows [1]:

```
void CGView::wheelEvent(QWheelEvent* event) {
        double dz = 1.0;
        if (event->delta() < 0) dz = 1.1; else dz = 1/1.1;
        // Let ‘x‘, ‘y‘ be screen coordinates of last mouse move event,
        // then ‘px‘ and ‘py‘ are world coordinates of ‘p‘
        double px, py;
        worldCoord(x, y, px, py);
        centerX = px - (px - centerX) / dz;
        centerY = py - (py - centerY) / dz;
        zoom *= dz;
        update();
}
```

[1] Unfortunately, it works only if one *drags* the mouse, there is no reaction if the mouse *moves*. It's not clear whether it has something to do with exotic window managers or something else. However, it's just an annoying QT problem, it has nothing to do with geometry or graphics.