

Homework 5a

(the Homework 5 was divided on two homeworks: 5a, and 5b)

Consider the following curves:

$$C_1: \mathbf{r}(t) \begin{cases} x = t \\ y = 2t^2 - 1, \end{cases} \quad 0 < t < 1, \quad C_2: \mathbf{r}(t) \begin{cases} x = t \\ y = 2t^2 - 1, \end{cases} \quad -1 < t < 1,$$

$$C_3: \mathbf{r}(t) \begin{cases} x = 2t \\ y = 8t^2 - 1, \end{cases} \quad 0 < t < \frac{1}{2}, \quad C_4: \mathbf{r}(t) \begin{cases} x = \cos t \\ y = \cos 2t, \end{cases} \quad 0 < t < \frac{\pi}{2},$$

$$C_5: \mathbf{r}(t) \begin{cases} x = t \\ y = 2t - 1, \end{cases} \quad 0 < t < 1, \quad C_6: \mathbf{r}(t) \begin{cases} x = 1 - t \\ y = 1 - 2t, \end{cases} \quad 0 < t < 1,$$

$$C_7: \mathbf{r}(t) \begin{cases} x = \sin^2 t \\ y = -\cos 2t, \end{cases} \quad 0 < t < \frac{\pi}{2}, \quad C_8: \mathbf{r}(t) \begin{cases} x = t \\ y = \sqrt{1 - t^2}, \end{cases} \quad -1 < t < 1,$$

$$C_9: \mathbf{r}(t) \begin{cases} x = \cos t \\ y = \sin t, \end{cases} \quad 0 < t < \pi, \quad C_{10}: \mathbf{r}(t) \begin{cases} x = \cos 2t \\ y = \sin 2t, \end{cases} \quad 0 < t < \frac{\pi}{2},$$

$$C_{11}: \mathbf{r}(t) \begin{cases} x = \cos t \\ y = \sin t, \end{cases} \quad 0 < t < 2\pi, \quad C_{12}: \mathbf{r}(t) \begin{cases} x = a \cos t \\ y = b \sin t, \end{cases} \quad 0 < t < 2\pi \text{ (ellipse),}$$

Draw the images of these curves.

Write down their velocity vectors.

Indicate parameterised curves which have the same image (equivalent curves).

In each equivalence class of parameterised curves indicate curves with same and opposite orientations.