Space curves

9.1 Find the tangent plane to the curve $\overrightarrow{r} = [a\cos t, b\sin t, e^t]$.

9.2 Find the tangent plane to the curve $\overrightarrow{r} = [t, t^2, t^3]$ which pass through point $M\left(2, -\frac{1}{3}, -6\right)$.

9.3 In which points of the curve $\overrightarrow{r} = \left[\frac{a}{2}(1+\cos u), \frac{a}{2}\sin u, a\sin(\frac{u}{2})\right]$ tagnent plane is parallel to y-axis?

9.4 Find equations of normal and binormal lines of the curve $x = y^2$, $x^2 = z$ at point $P(1,1,1)$

9.5 Find points of the curve

$$\begin{cases} x = \dfrac{2}{t} \\ y = \ln t \\ x = -t^2 \end{cases}$$

in which binormal line is parallel to the plane $x - y + 8z + 2 = 0$

9.6 Find curvature and torsion of the curves:

a) $\overrightarrow{r} = \left[u, \frac{1}{2}u^2, \frac{1}{3}u^3\right]$ dla $u = 1$

b) $\overrightarrow{r} = \left[e^t, e^{-t}, t\sqrt{2}\right]$

c) $\overrightarrow{r} = [2t, \ln t, t^2]$