Computer_graphics A3 report

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1. algorithm

(1) first, I made 9 spheres to represent the solar system.

(2) And, Each designated radius, rotational speed, and distance away from the sun.

(3) Change the model matrix based on what's shown in number two,

- scale the model matrix based on radius
- rotate the model matrix based on rotating time
- translate the model matrix based on distance(how far away from the sun).
- rotate the model matrix based on revolution time

(4) To represent the last requirement I changed my view matrix

- If you press shift and press the left mouse button, view matrix is scaled by mouse movment.
- If you press shift and press the left mouse button, view matrix is translated by mouse movment

2. other options

(1) If you press 'r' all the elements are rotate.

(2) If you press 'D' all of the 'planets' are change the color randomly.

(3) If you press 'S' orbits are change to an elipse. (except mercury)

To represent this,

- rotate the model matrix based on rotating time
- rotate the model matrix based on revolution time...①
- scale the model matrix x-axis by 1 / (major_radius / minor_radius)...①
- rotate the model matrix based on -revolution time...①
- translate the model matrix based on distance(how far away from the sun)
- rotate the model matrix based on revolution time
- scale the model matrix x-axis by major_radius / minor_radius)...②
- translate the model matrix to x-axis based on -(major_radius / minor_radius - 1) * distance...③

I implement ② to scale the circle. But spheres has all turned into an ellipsoid. So I implement ① to make sphere again. And I put ③ to express two centers of ellipse.

(4) If you press '+' or '-', you can change the major radius (on elipse)

(5) If you press 'm', you can see satellites on Earth (1), Mars(2), Jupiter(3), Saturn(3), Uranus(3), Neptune(3).

- Satellites are always follow the planet even if the ellipse orbit. And also rotate.
To represent this,
I divided two part.

If orbit is not ellipse,
- rotate the model matrix based on rotating time.
- scale the model matrix based on satellite radius.
- translate the model matrix based on satellite distance.
- rotate the model matrix based on satellite revolution time.
- translate the model matrix based on planet's distance.
- rotate the model matrix based on planet's revolution time.

orbit is not ellipse,
- rotate the model matrix based on rotating time.
- rotate the model matrix based on planet's revolution time and satellite revolution time.
- scale the model matrix x-axis based on 1/(major radius / minor_radius).
- Oposite rotate the model matrix based on planet's revolution time and satellite revolution time.
- translate the model matrix based on satellite distance.
- rotate the model matrix based on satellite revolution time.
- translate the model matrix based on planet's distance.
- rotate the model matrix based on planet's revolution time.
- scale the model matrix x-axis based on (major radius / minor_radius)
- translate the model matrix to x-axis based on -(major_radius / minor_radius - 1)

satellite's orbit is also ellipse. If planet's orbit is ellipse