The exam is scheduled for Monday 26 Sep. Calculators and other electronic devices are not allowed; the problems are designed with that in mind.

The exam will cover those topics in Chapters 12 and 13 that are listed below. Focus only on the list below. There are 9 things to do on the exam – some problems have multiple parts. Formulas are not provided; we will discuss in class exactly what you need.

To study for the exam, work problems. Do the assigned problems over again. Do appropriate problems at the end of the chapter.

- Find the parametric equation for a line
- Find the equation for a plane given 2 points and normal vector, or 3 points
- Find the distance between a point and a plane
- Find the intersection of a plane and a line
- Find the angle between 2 vectors
- Find a vector orthogonal to 2 vectors
- Find the projection of \( \vec{u} \) onto \( \vec{v} \) (know the formula)
- Decompose a vector into components that are parallel and perpendicular to a second vector
- Find the area of a parallelogram spanned by 2 vectors
- Recognize equations and graphs for ellipsoids, elliptical paraboloids and hyperboloids of one sheet
- Find the intersection of 2 surfaces
- Find the velocity and acceleration vectors for \( \mathbf{r}(t) \)
- Find the arc length of \( \mathbf{r}(t) \)
- Find the unit tangent vector and unit normal vector of \( \mathbf{r}(t) \)
- Find the curvature and speed of \( \mathbf{r}(t) \) (for curvature, use \( |\hat{T}'|/v \))
- Solve a 3D projectile motion problem given the initial position and velocity
- Find the magnitude of the tangential and normal components of acceleration for \( \mathbf{r}(t) \) (that’s \( v' \) and \( \kappa v^2 \) respectively)