This week on the problem set you will get practice thinking about potential functions and calculating line integrals.

Homework: The homework will be due on Monday 25 November. It will consist of questions:

17.4.41 and 17.5.22.

*Numbers in parentheses indicate the question has been taken from the textbook:

J. Rogawski, C. Adams, *Calculus, Multivariable*, 3rd Ed., W. H. Freeman & Company,

and refer to the section and question number in the textbook.

1. (Section 17.4) 2, 3, 5, 8, 9, 10, 13, 14, 17, 18, 27, 30, 34, 37, 40, 41^*, 46^* 48^*. (questions are the same in previous versions)
2. (Section 17.5) 1, 6, 7, 12, 17, 18, 21, 22, 31^*, 35. (questions are the same in previous versions)
3. (17.4.41) Prove a famous result of Archimedes: The surface area of the portion of the sphere of radius R between two horizontal planes $z = a$ and $z = b$ is equal to the surface area of the circumscribed cylinder (Figure 22).

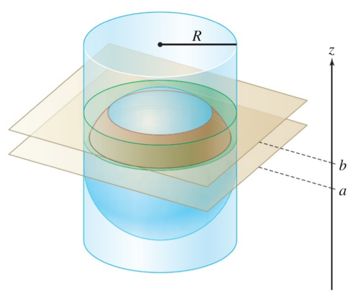

FIGURE 22

4. (17.5.22) Let $\mathcal{S}$ be the ellipsoid $\left(\frac{x}{4}\right)^2 + \left(\frac{y}{3}\right)^2 + \left(\frac{z}{2}\right)^2 = 1$. Calculate the flux of $\mathbf{F} = z\mathbf{i}$ over the portion of $\mathcal{S}$ where $x, y, z \le 0$ with upward-pointing normal. Hint: Parametrize $\mathcal{S}$ using a modified form of spherical coordinates (θ, ϕ).

*The questions marked with an asterisk are more difficult or are of a form that would not appear on an exam. Nonetheless they are worth thinking about as they often test understanding at a deeper conceptual level.