

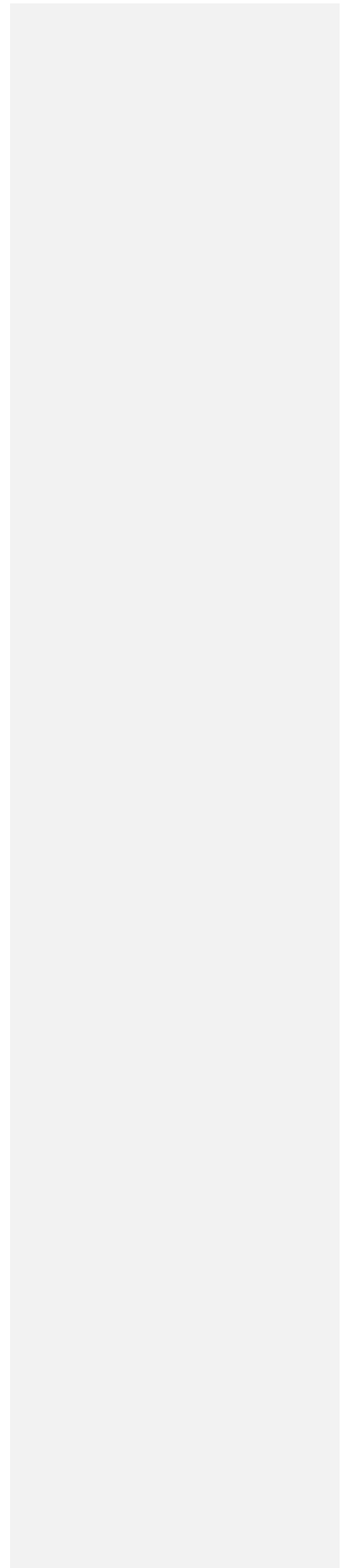
Orthogonal matrices; diagonalization of symmetric real matrices.
Properties of orthogonal endomorphisms of \mathbf{R}^2 and \mathbf{R}^3 .

Plane curves; tangent vector at a point, metric properties of plane curves (arc length, curvature).

Surfaces in \mathbb{R}^3 ; tangent plane, normal vector, Gaussian curvature, mean curvature.

[First and second principles of thermodynamics](#)

Phy



as well as $f(g(x))$.

Rules of derivation of the product and the quotient of two functions of a real variable.

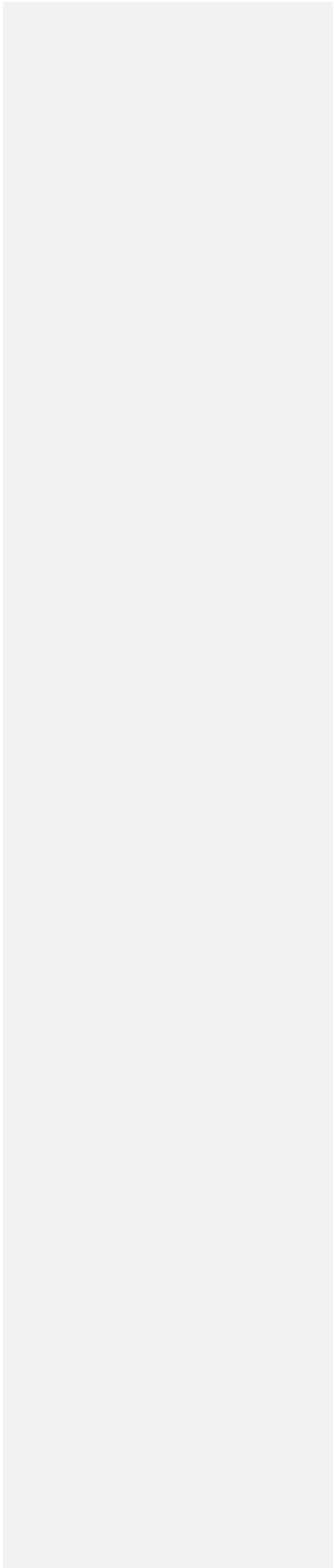
Primitives of the basic functions above.

Integration by parts, $\int u'v = uv - \int uv'$.

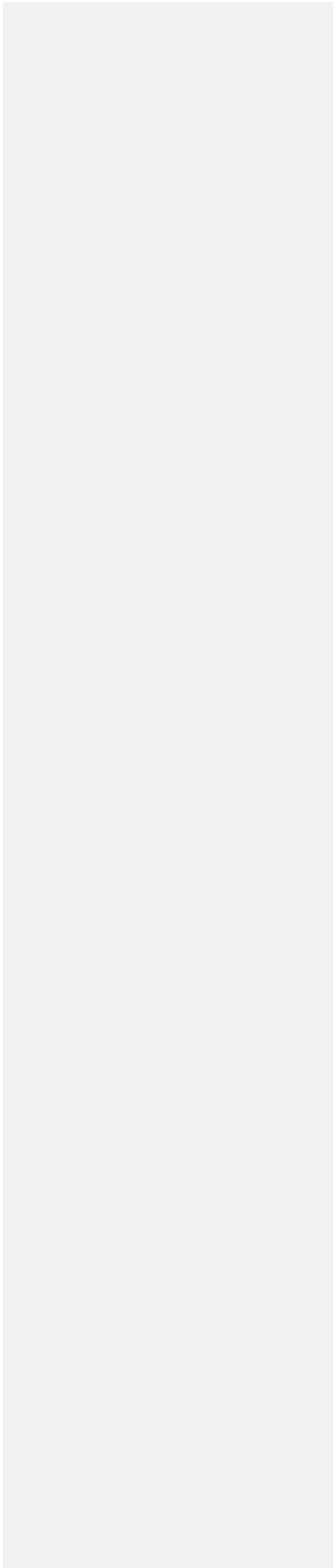
$$\dots \dots \partial^2 f \dots \partial^2 f \dots \partial^2 f \dots$$

Compute

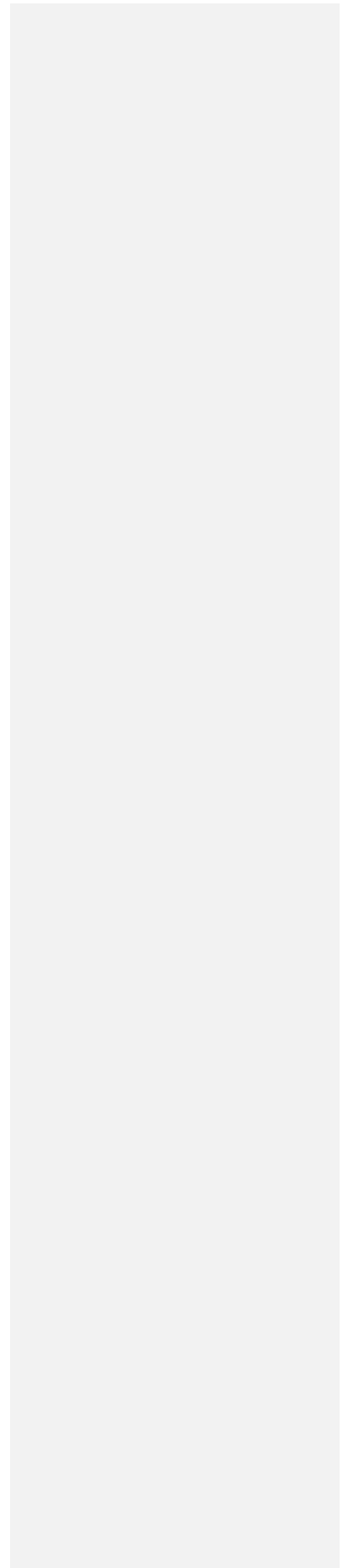
Multiple integrals. Stokes, Gauss & Ostrogradski theorems.



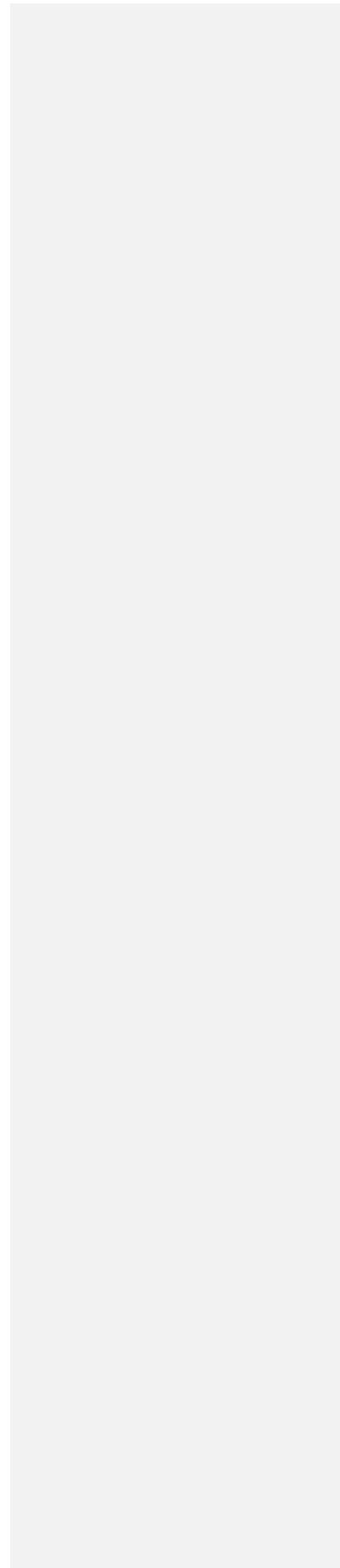
Second order linear and homogeneous differential equations



Linear algebra



The definitions of a stationary flow, of an incompressible flow ($\nabla \cdot \vec{v} = 0$ in all points), of a non-



distribution of the electrostatic potential between the plates of a planar capacitor should be known.

The concept of electric dipole, the field created by a dipole at a large distance, as well as the interaction energy of a permanent dipole \vec{p} with an electric field $\vec{E} = \vec{E}_0$, should be known to

the applicants, as well as the definition of the polarization density vector $\vec{P} = \frac{1}{V} \sum \vec{p}_i$ where V is the volume.

where A is a normalization factor. The equipartition theorem results :

$$\langle v_x^2 \rangle = \langle v_y^2 \rangle = \langle v_z^2 \rangle = \frac{k_B T}{m} \text{ as well as } \langle v^2 \rangle = \frac{3k_B T}{m} \text{ and } \langle \frac{1}{2} m v^2 \rangle = \frac{3}{2} k_B T$$

Collisions against walls. Relationship between pressure and mean square velocity.

