Formeln S66 S70

Since you've asked for formulas from pages 66-70 but the provided text only includes up to page 65, I can only list the formulas from the provided text. Here are the formulas along with their titles or relevant context:

Lagrange Multipliers in 2D

- $g(x, y) = 0$ (Equation 2.217)
- $\nabla f = \lambda \cdot \nabla g$ (Equation 2.218)
- $0 = \nabla \hat{e} f = \langle \hat{e}, \nabla f \rangle$ (Equation 2.219)
- System for finding extrema under constraints:

$$(Equation 2.220)$$

$$\begin{cases} \nabla f = \lambda \cdot \nabla g \\ \\ g(x, y) = 0 \end{cases}$$

(Equation 2.220)

- $w(x, y, \lambda) = f(x, y) - \lambda \cdot g(x, y)$ (Equation 2.221)

Integration by Substitution

- $\int f(u(x)) \cdot u'(x)\, dx = \int f(u)\, du = F(u(x)) + c$ (Equation 3.1)
- $\int_{x_0}^{x_E} f(u(x)) \cdot u'(x)\, dx = \int_{u(x_0)}^{u(x_E)} f(u)\, du = F(u(x_E)) - F(u(x_0))$
- $F(x) = \int x \cdot \cos(x^2)\, dx$ (Equation 3.2)
- $u(x) := x^2 \Rightarrow u'(x) = 2x$ (Equation 3.3)
- $F(x) = \frac{1}{2} \int \cos(u)\, du = \frac{1}{2} \cdot \sin(u) + c = \frac{1}{2} \cdot \sin(x^2) + c$ (Equation 3.4)
- $\frac{du}{dx} = 2x \Leftrightarrow du = 2x\, dx \Leftrightarrow dx = \frac{1}{2x} du$ (Equation 3.5)
- $F(x) = \frac{1}{2} \int \cos(u)\, du = \frac{1}{2} \cdot \sin(x^2) + c$ (Equation 3.6)
- $F(x) = \int \frac{\sin(x)}{\cos(x)}\, dx$ (Equation 3.7)
- $u(x) := \cos(x) \Rightarrow u'(x) = -\sin(x)$ (Equation 3.8)
- $\frac{du}{dx} = -\sin(x) \Leftrightarrow du = -\sin(x)\, dx \Leftrightarrow dx = -\frac{1}{\sin(x)} du$ (Equation 3.9)
- $F(x) = -\int \frac{1}{u}\, du = -\ln(|u|) + c = -\ln(|\cos(x)|) + c$ (Equation 3.10)
- $I = \int_0^1 \sqrt{1 - x^2}\, dx = \int_0^1 \sqrt{1 - u^2}\, du$ (Equation 3.11)
- $u(\phi) := \sin(\phi) \Rightarrow u'(\phi) = \cos(\phi)$ (Equation 3.12)
- $\frac{du}{d\phi} = \cos(\phi) \Leftrightarrow du = \cos(\phi)\, d\phi$ (Equation 3.13)
- $I = \int_0^{\pi/2} \cos^2(\phi)\, d\phi = \frac{\pi}{4}$ (Equation 3.14)
- $x \mapsto u$ or $u \mapsto x$ (Equation 3.15)
- $\delta I \approx f(u(x)) \cdot u'(x) \cdot \delta x \approx f(u(x)) \cdot \delta u$ (Equation 3.16)
- $u(x) = m \cdot x + q \Rightarrow \frac{du}{dx} = u'(x) = m \Leftrightarrow dx = \frac{1}{m} du$ (Equation 3.17)

These formulas cover the topics of Lagrange multipliers for finding extrema under constraints and various methods and examples of integration by substitution.