Introduction to MATH 127

Calculus of Single Variable Functions

Calculus of Multivariable Functions - Chapters 14, 15

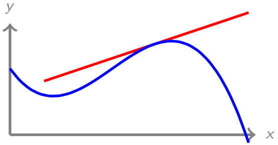
Curves and Surfaces - Chapters 13, 16

Vector Calculus - Chapters 16, 17

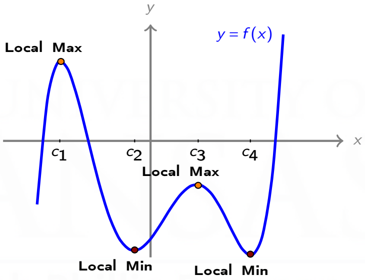
1 Calculus of Single Variable Functions

Calculus of Single Variable Functions

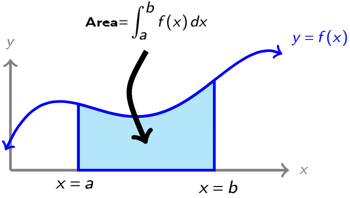
Derivatives - Rates of Change - Tangent Lines



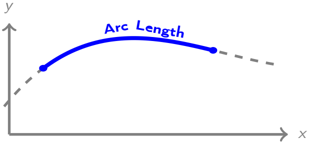
Optimization



Fundamental Theorem of Calculus - Area Under Curve



Arc Length



2 Calculus of Multivariable Functions - Chapters 14, 15

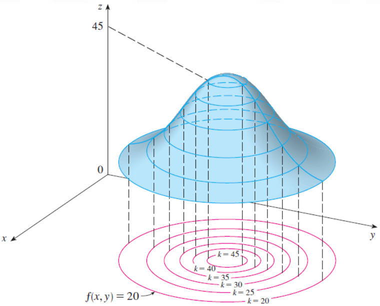
Calculus of Multivariable Functions

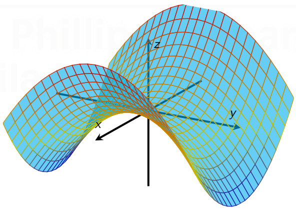
- Scalar Valued Functions $\qquad f : \mathbb{R}^2 \to \mathbb{R}$

$$z = f(x, y) \qquad w = g(x, y, z) \qquad t = h(x_1, x_2, \ldots, x_n)$$

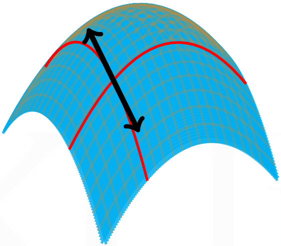
Examples:

(i) $z = x^2 + y^2$ $\qquad$ (ii) $w = e^{xyz}$ $\qquad$ (iii) $t = \cos(x_1)\sin(x_2) + x_3 e^{x_4}$

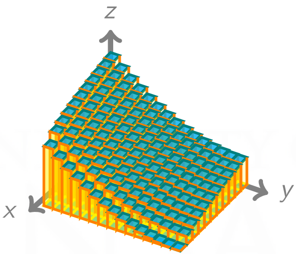




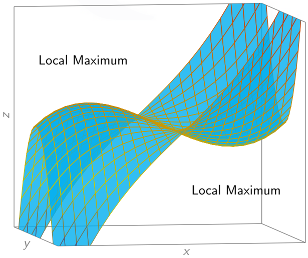
Partial Derivatives



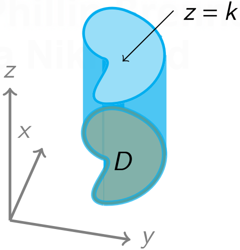
Integration



Optimization



Volume

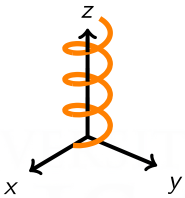


3 Curves and Surfaces - Chapters 13, 16

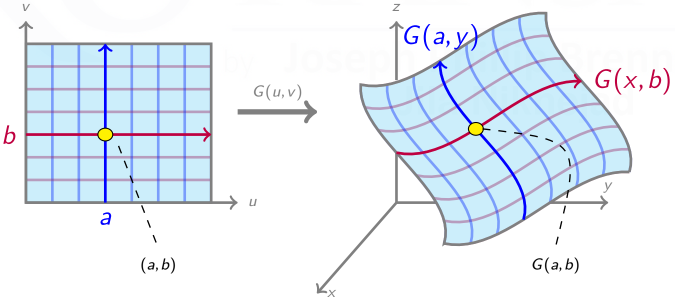
Vector Valued Functions

Curves $\vec{r}(t) = \langle x(t), y(t), z(t) \rangle$

<u>*Helix*</u> $\vec{r}(t) = \langle \sin(t), \cos(t), t \rangle$



Surfaces $\vec{r}(u,v) = \langle x(u,v), y(u,v), z(u,v) \rangle$



4 Vector Calculus - Chapters 16, 17

Vector Fields