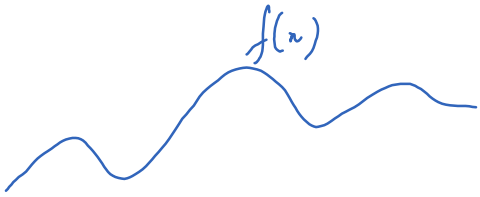
Lecture 1

Tuesday, January 12, 2021 2:19 PM

* Prayer

* Spiritual thought : the Spirit makes us happy. When we are happy, we learn better (Math and any other subject)

* Math 314 is an extension of Math 112 (Calculus I).



graph of a function of one variable

graph of a function of two variables

2D humps & troughs : when derivatives = 0

3D hills & valleys : when derivatives = 0

we have to make sense what this means

Graph of a function of two variables is a surface.

Syllabus ——— grading : HW, online HW, Midterm, Final

HW: drop lowest 4

online HW: optional

Final: not comprehensive

online

Learning Suite

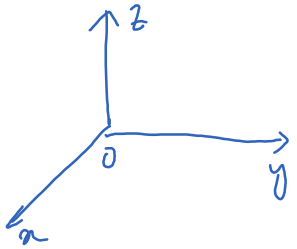
WebAssign : Solution to odd problems.

Ex: $f(x,y) = 1$

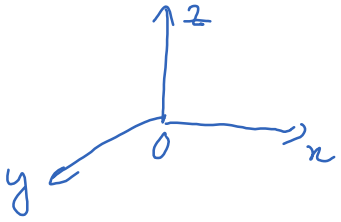
$f(x,y) = x$

$f(x,y) = x^2 + y^2$

Orientation:



Positive orientation



Negative orientation

Right-hand rule
"Head-toe" rule
} example of the classroom corner

Introduce Mathematica .... (if time allows)

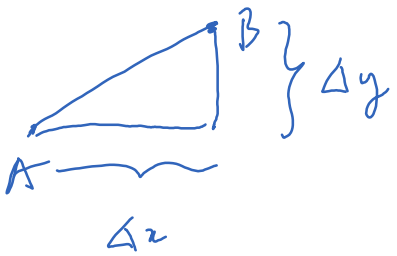
Points vs vectors

position displacement/ movement

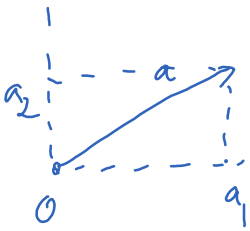
$A(1,2,3)$

$a = \langle 1, 2, 3 \rangle$

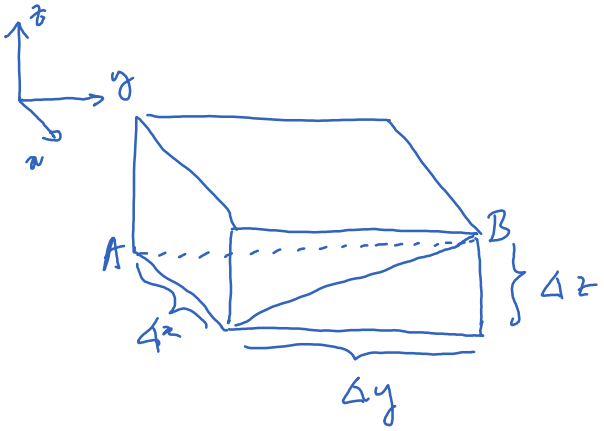
One can compute the distance between two points by Pythagorean thm.



$$AB = \sqrt{(\Delta x)^2 + (\Delta y)^2}$$



$$|a| = \sqrt{a_1^2 + a_2^2}$$



$$AB = \sqrt{(\Delta x)^2 + (\Delta y)^2 + (\Delta z)^2}$$

Ex:

$A(1, 0, -1)$

$B(3, 2, 0)$

$C(3, -4, 3)$

Is the triangle ABC a right triangle, obtuse or acute triangle?

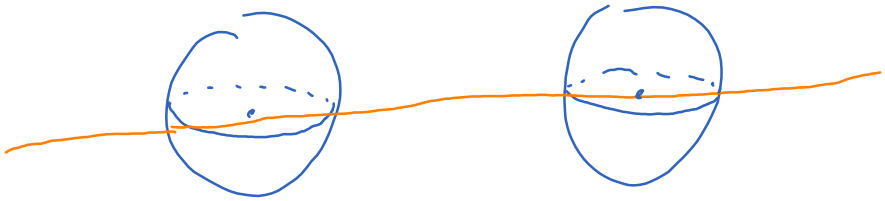
$$AB = \sqrt{2^2 + 2^2 + 1^2} = 3$$

$$BC = \sqrt{0^2 + 6^2 + 3^2} = \sqrt{45} = 3\sqrt{5}$$

$$AC = \sqrt{2^2 + 4^2 + 4^2} = 6$$

} right triangle

Ex: distance between two spheres

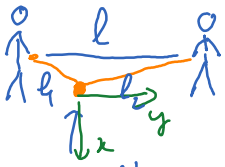


Centered at $(1,1,1)$ radius 1

Centered at $(-1,0,2)$ radius 2

Vectors

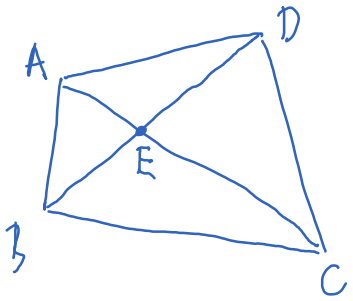
addition
subtraction
scaling
dot product
angle
cross product



$l = 8$ ft
$l_1 = 3$ ft
$l_2 = 6$ ft

$$\vec{T_1} + \vec{T_2} + \vec{P} = 0$$

Ex



A(1, 2, 3)
B(2, 4, 2)
C(0, 1, 1)
D(2, 5, -1)

$\vec{BA} = (1, 2, -1)$
$\vec{BC} = (-2, -3, -1)$

Find coord of E.