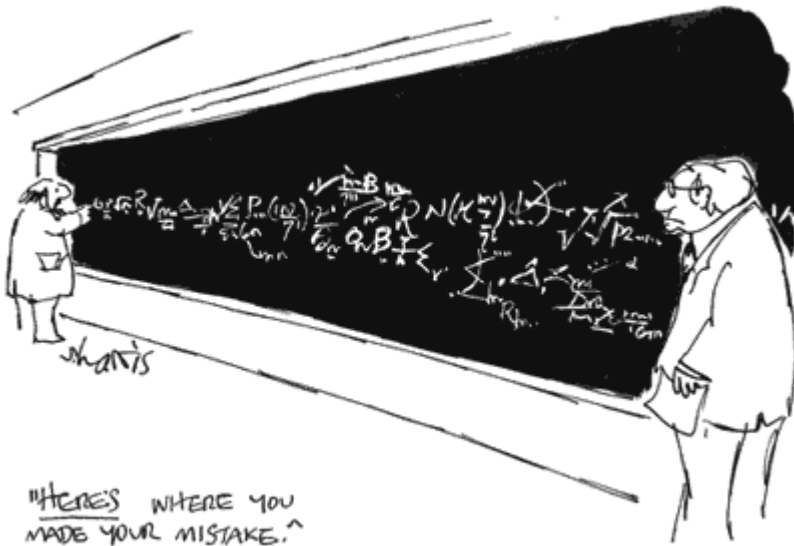
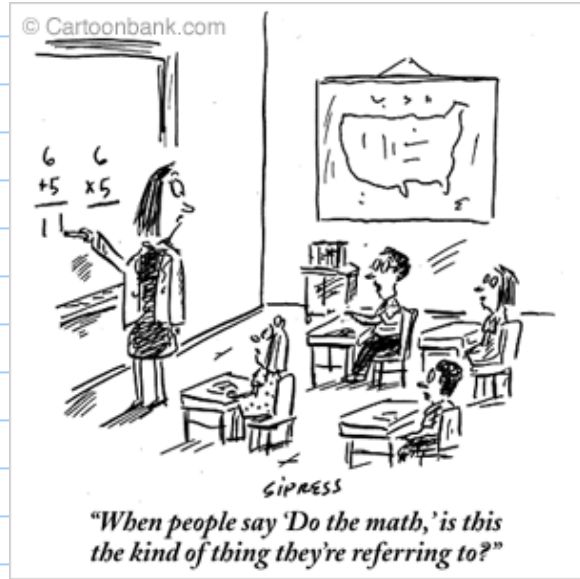


a) MYTHOLOGY

1) 'advanced' math involves bigger formulas?



"HERE'S WHERE YOU MADE YOUR MISTAKE."



"When people say 'Do the math,' is this the kind of thing they're referring to?"

formulas  
equations  
algorithms



concepts  
ideas  
abstractions

- ANALOGIES IN LEARNING

BASKETBALL

drills: pass / shoot



playing offense / def.

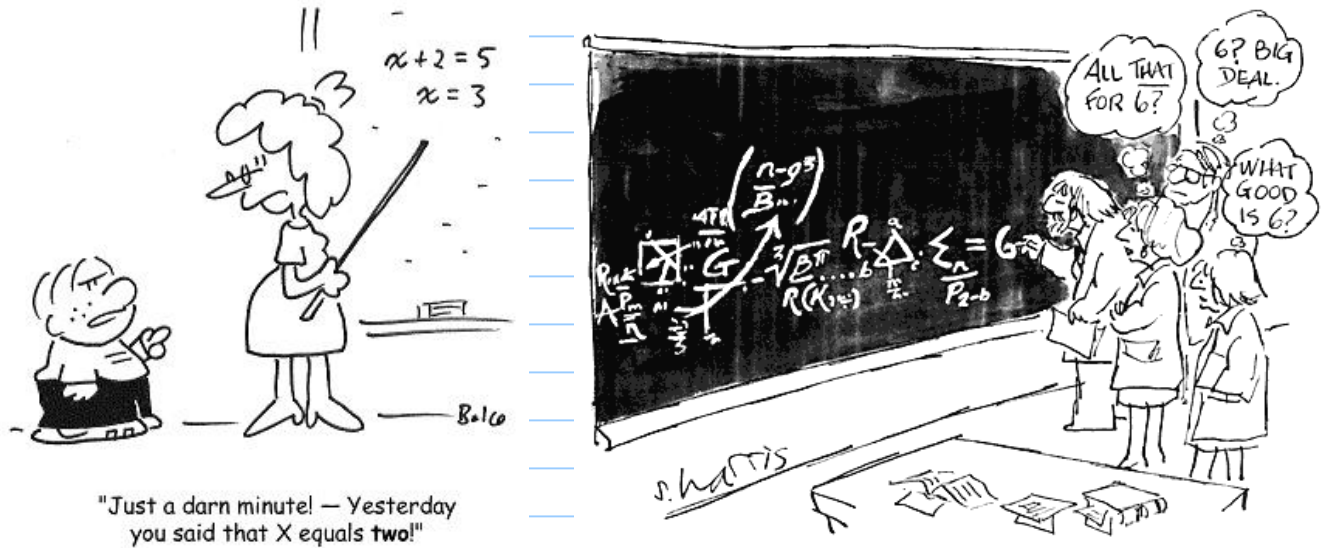
ITALIAN

vocab, grammar



conversation + prose

2) do more examples !



- problem recognition: exam problems are usually not "homework problems with the numbers changed"

- MATH 251: 32 sections of text, exam problems will combine ideas

• multi-step problems

- examples can be illustrative, but sometimes don't communicate well the concept

3) give more applications!

INTERDISCIPLINARY STUDIES

	ROOM
CHEMISTRY FOR GEOLOGISTS	127
MATH FOR ARCHEOLOGISTS	214
PHYSICS FOR PSYCHOLOGISTS	206
BIOLOGY FOR MATHEMATICIANS	319
GEOLOGY FOR ENTOMOLOGISTS	114
BOTANY FOR ASTRONOMERS	
ANATOMY FOR PHYSICISTS	
PSYCHOLOGY FOR LABORATORIANS	
ANTHROPOLOGY FOR CHEMISTS	
TOPOLOGY FOR PALEONTOLOGISTS	
NUCLEAR PHYSICS	

J. Harris



- required for

- MATH
- STAT
- PHYS
- CHEM
- ENSC.

- some application areas:

gateway to math analysis & diff'l equations

probability theory

electromagnetism, forces & potentials

celestial mechanics & astrophysics

thermodynamics & comput. quantum chem

hydrology, geology & GPS.

computer graphics

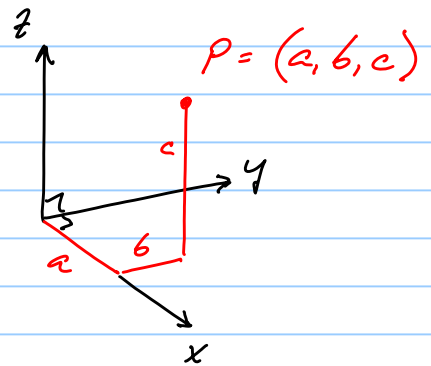
6) WEEK 1 READING  
- sections 12.1-4

3D coordinates  
vectors  
dot product  
cross product

c) COORDINATES IN 3 DIMENSIONS (s12.1)

- right-hand rule avoids  
mirror-inverted math!

- a POINT can be uniquely  
identified in 3D space ( $\mathbb{R}^3$ ) by  
an ordered triple of (rectangular)  
coordinates  $P = (a, b, c)$  (p765)



- points in the 2D  $x, y$ -plane have  $z = 0$

d) SETS OF POINTS

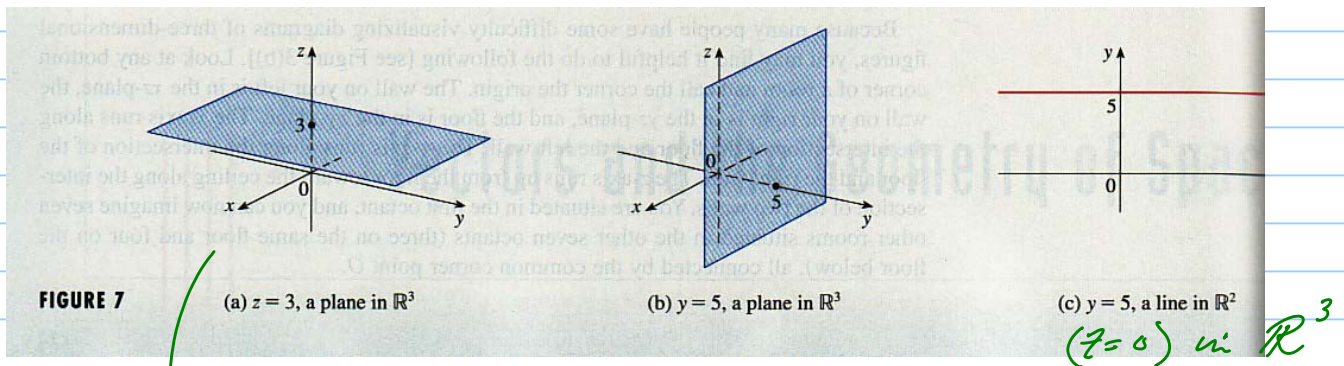
- example 1: what is the set of points whose  $z$ -coordinate  
is  $z = 3$ ?

- set notation

$$S = \{ (x, y, z) \mid z = 3 \}$$

ordered  
triple in  $\mathbb{R}^3$  such that

- for instance  $(1, 2, 3)$ ,  $(10, -\pi, 3)$ ,  $(0, 10^6, 3)$   
are in the set  $S$



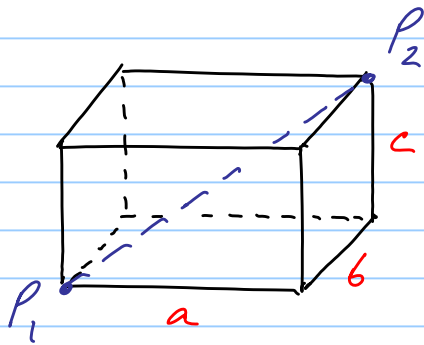
the set of points  
with  $z=3$   
plane  $\parallel$  to  $x, y$ -axis

- fig 7b  $\{(x, y, z) \mid y=5\}$  is a plane  
(surface) in  $\mathbb{R}^3$

- fig 7c  $\{(x, y) \mid y=5\}$  is a LINE in  $\mathbb{R}^2$

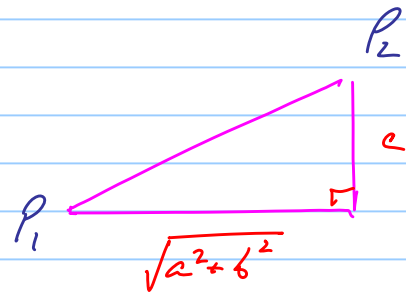
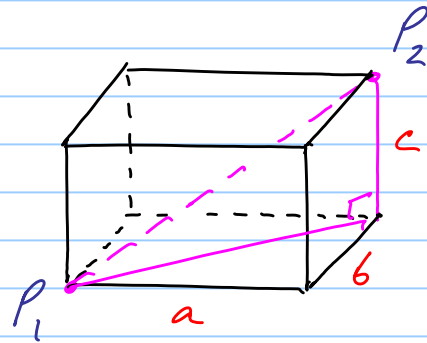
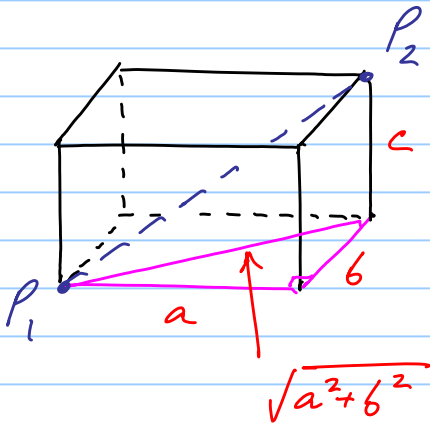
e) DISTANCE BETWEEN 2 POINTS IN  $\mathbb{R}^3$

- WHAT IS THE LENGTH OF THE DIAGONAL OF A  
3D RECTANGULAR BOX?



$$|P_1 P_2| = \sqrt{a^2 + b^2 + c^2}$$

by Pythagorean formula for right-angle triangles



$$|P_1 P_2| = \sqrt{\sqrt{a^2 + b^2}^2 + c^2} = \sqrt{a^2 + b^2 + c^2}$$