Math 1210-1
Monday Jan 11, 9:40-10:30 AM, WEB L112
(Tuesdays, we meet in WEB L110.)

- go over syllabus and course outline
- Lines! (see 0.3 of text)

HW for tomorrow: write a paragraph or two about who you are, your expected major (and college interests), and why you're taking Math 1210. Hand in tomorrow, at start of class. Thanks!

slope of a line

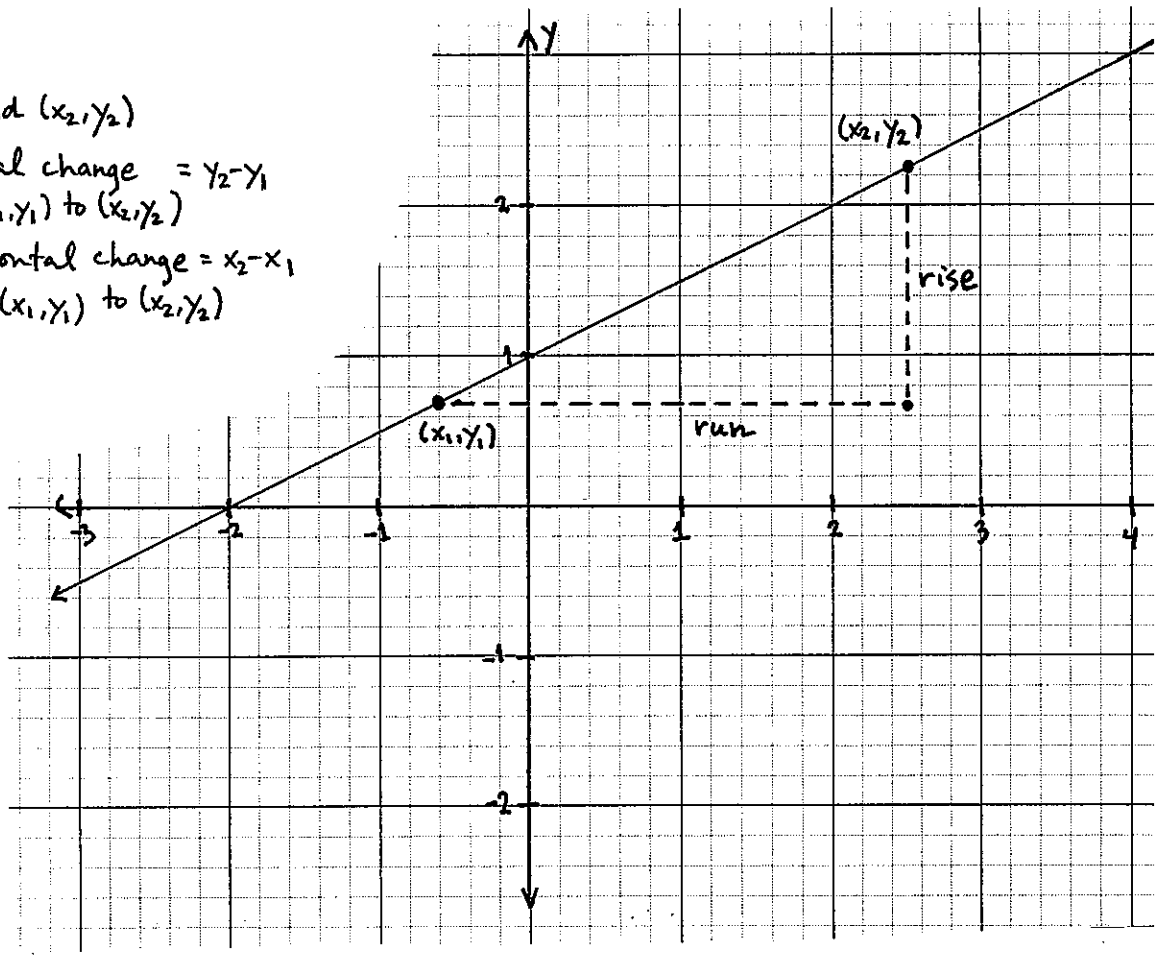
$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

between (x_1, y_1) and (x_2, y_2)

where rise = vertical change $= y_2 - y_1$
from (x_1, y_1) to (x_2, y_2)

run = horizontal change $= x_2 - x_1$
from (x_1, y_1) to (x_2, y_2)

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1} = m$$



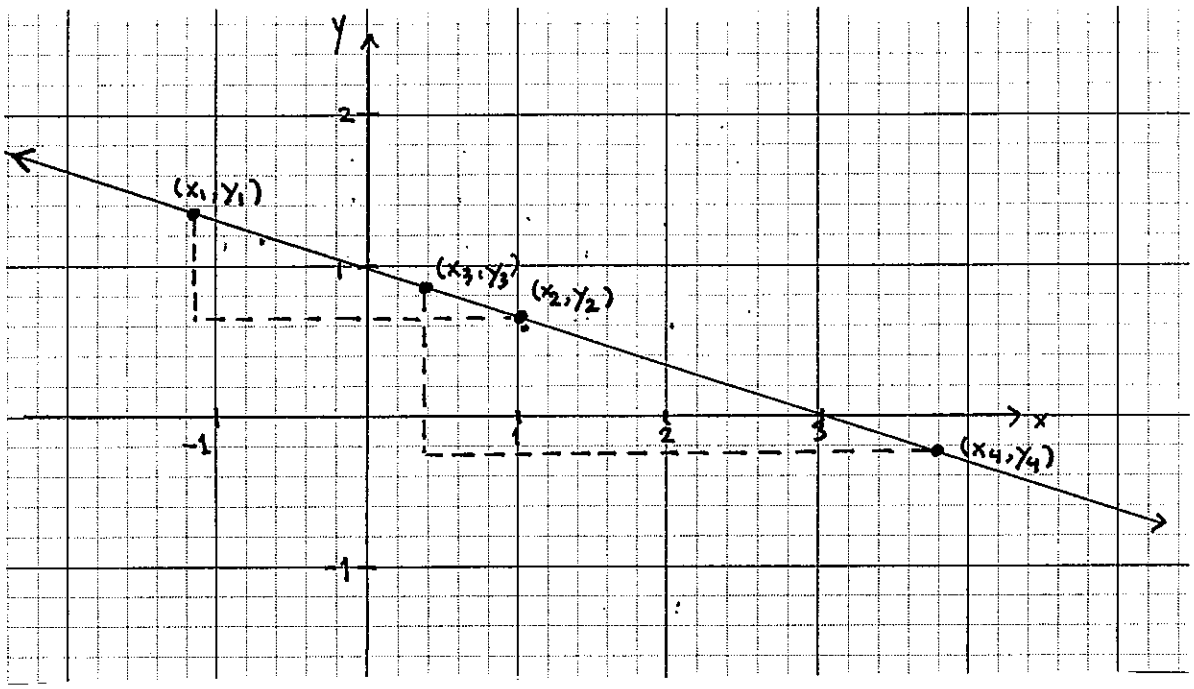
Exercise 1 Find m (slope) on the line above, from (0,1) to (2,2)

Exercise 2 How about from (2,2) to (0,1)

Exercise 3 Try other pairs of points on the same line. Is the slope always the same?

Exercise 4 What does $m > 0$ mean about the inclination of a line? How about $m < 0$?

- Why value of slope is independent of choice of pair of points on a given line: Use geometry! Hint: similar triangles



point-slope form of equation for a line through (x_0, y_0) with slope m

If (x, y) is a variable point on the line

$$m = \frac{y - y_0}{x - x_0}$$

yields

$$\boxed{(y - y_0) = m(x - x_0)}$$

Exercise 5: The point $(3, 0)$ is on the line above. What is the point slope equation of this line, using $(3, 0)$?

Exercise 6 Find an equation of the line through $(-1,-1)$ and $(1,2)$, and sketch it on previous page.

slope-intercept form: If you simplify the point-slope form of the equation for a line (by solving for y), you get

$$y = mx + b \qquad \text{(where } b = y_0 - mx_0\text{)}$$

this line intercepts the y-axis when $x=0$, and then $y = m0 + b = b$
so b is the y-intercept

Exercise 7: Put the line equations from exercises 5, 6 into slope-intercept form, and compare to your sketches

Slopes of lines are rates of change

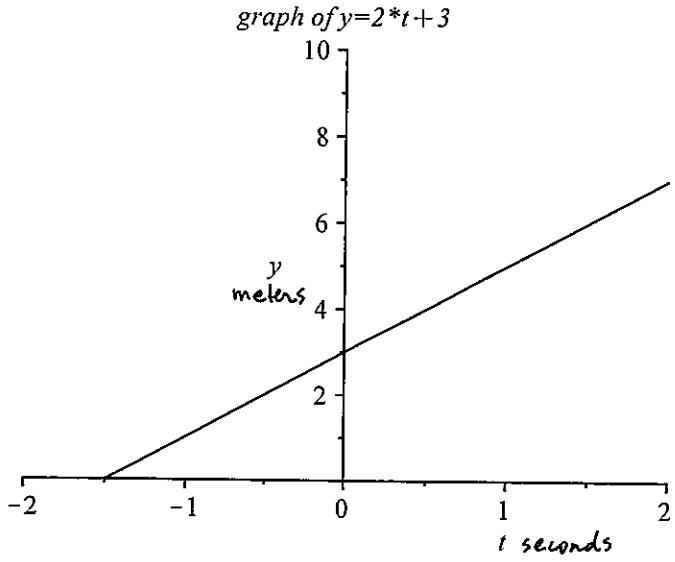
You can see this if you include units in your discussion - units are your friend.

Exercise 8

an object moves along a number line so that its location at time t seconds is $f(t) = 2t + 3$ meters.

What is the slope of the graph $y = 2t + 3$ (at $t = 1$ sec.)?

What do you call this quantity, in physics?



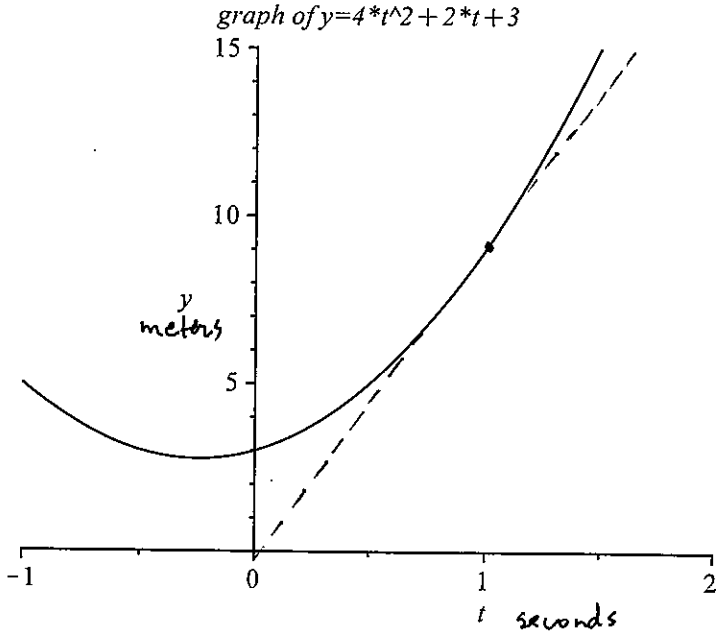
Exercise 9

an object moves along a number line so that its location at time t seconds is

$$g(t) = 4t^2 + 2t + 3 \text{ meters.}$$

What is the slope of the graph $y = g(t)$ at $t = 1$ sec?

(Where we mean the slope of the tangent line to the point on the graph for which $t = 1$ sec.)



Summary!