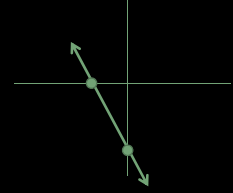Section 5.4

FINDING LINEAR EQUATIONS

Slope

- Orientation of a line
- change in y divided by change in x
- (0, -5), (-2, 0)
- Commonly designated m

Slope

- Positive: rises to right
- Negative: falls to right
- No slope: horizontal
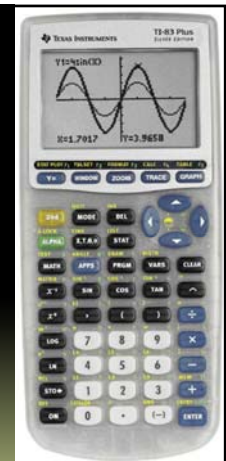- Undefined: vertical
- No slope ≠ undefined

Slope

- Orientation of a line
- Slope-Intercept Equation: $y = mx + b$
- Slope is m in the equation
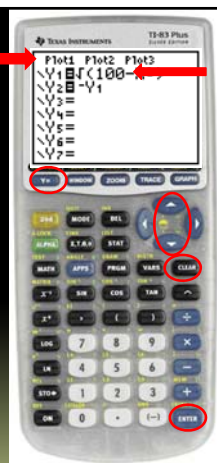- This equation has a slope of +2

$$y = 2x - 5$$

Find equation from slope and point

$$y = mx + b$$

- Slope = 2 (this is m)
- Point (4, 3)   (x, y) right?
- Put m, x and y in
- Find b

$$3 = 2(4) + b$$

- b= −5
- Equation of the line: put in m and b

$$y = 2x - 5$$

Calculator check of Linear Equations from slope and point
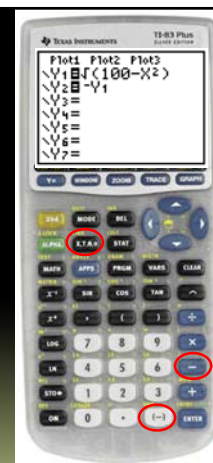
Calculator check

- Upper left [y=] button
  - any "Plot#" dark: Unselect them
    - Up arrow
    - [Enter] key
    - Arrow to right and repeat
  - Any equations:
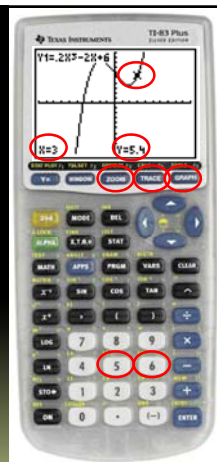   - clear them with [clear]
    - Down arrow and repeat

Calculator check

- Write equation 2x—5
- [X] button is to right of alpha key
- Use the operator [−] in right column
- [(−)] is for negative numbers

Calculator check

- Press graph: upper right
  - [zoom] [6], [zoom] [5] to center on origin and make square grid
  - [Trace] [4] [enter] will show x=4, y=3 and mark
- You used the calculator to check your work!! =)

Calculator check

- Upper left y= button
  - (are any "Plot" dark?Unselect them)
- Write equation 2x—5
- X button is to right of alpha key
- (−) is for negative numbers
- Use the operator — in right column
- Press graph: upper right
  - Zoom: 6, zoom 5 to center on origin and make square
  - Trace: 4 [enter] will show x=4, y=3 and flash

Find equation from slope and point

- Slope = $-\dfrac{2}{5}$
- Point (−4, 1)
- Put m, x and y in
- Find b
- b= $-\dfrac{3}{5}$
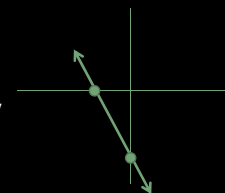- Equation of the line: put in m and b

$$y = mx + b$$

$$1 = -\frac{2}{5}(-4) + b$$

$$y = -\frac{2}{5}x - \frac{3}{5}$$

Slope

- Orientation of a line
- change in y divided by change in x
- (0, -5), (-2, 0)
- Find from points

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

Equation from two points

- Find slope

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

- Find the y-intercept using slope and one of the points
- Substitute m and b into slope-intercept equation

$$y = mx + b$$

Find equation from slope and point

$$y = mx + b$$

- Slope = m
- Point (x, y) right?
- Put m, x and y in
- Find b
- Equation of the line: put in m and b

Parallel lines

- Have the same slope
- But contain different points
- Write in slope-intercept form to find slope

$$y = mx + b$$

Find equation from slope and point

$$y = mx + b$$

- Slope = m
- Point (x, y) right?
- Put m, x and y in
- Find b
- Equation of the line: put in m and b

Perpendicular lines

- Have the opposite reciprocal slope
- Invert fraction notation of slope
- Change sign

$$y = -\frac{2}{5}x - \frac{3}{5}$$

$$m_1 = -\frac{2}{5}$$

$$m_2 = +\frac{5}{2}$$

Point-slope form of line

- This is the slope equation

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

- If you know a point, call it point 1
- Point 2 will be the generic variables of the equation: drop off the 2 from x and y
- Multiply both sides by $(x_2 - x_1)$ to get

$$(y - y_1) = m(x - x_1)$$

- Put in known point and slope

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