Review for Test 3

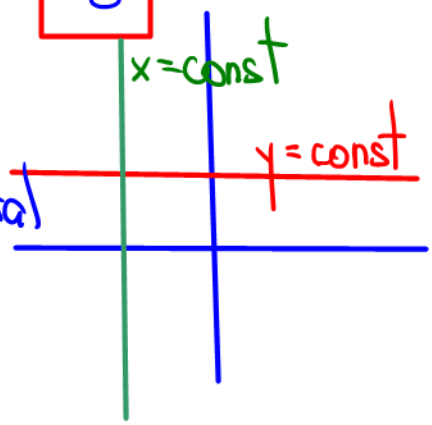
- Finding x and y intercepts
- Slope of a line
- Equation of a line: a) slope-intercept b) point-slope c) standard form
- Parallel lines and Perpendicular lines
- Functions; vertical line test and domain

Example 1: Find the slope of the line that passes through the points (-2,-4) and (6, -7).

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad m = \frac{-7-(-4)}{6-(-2)} = \frac{-7+4}{6+2} = \boxed{\frac{-3}{8}}$

Example 2: Find the x and y intercepts(if any) of the line



$-9y = 6$

$\frac{-9}{-9} \quad y = -\frac{6}{9} \quad y = -\frac{2}{3}$ Horizontal

No x-int., y-int. $= -\frac{2}{3}$ $\left(0, -\frac{2}{3}\right)$

$\frac{4x}{4} = \frac{8}{4} \quad x = 2$ Vertical

No y-int, x-int $= 2$ $(2, 0)$

$2x + y = 5$

x-int: set $y = 0$ $\quad 2x + 0 = 5$

$\frac{2x}{2} = \frac{5}{2}$

$x = 5/2$

$(5/2, 0)$

y-int: set $x = 0$

$2(0) + y = 5$

$y = 5 \quad (0, 5)$

Example 3: If $f(x) = -2x^2 - 5x + 1$, evaluate the following:

$f(-1) = -2(-1)^2 - 5(-1) + 1$

$= -2(1) + 5 + 1$

$= -2 + 5 + 1 = \boxed{4}$

$f(3) =$

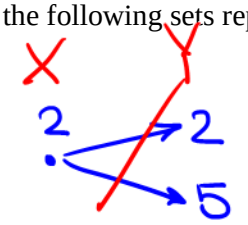
$-2(3)^2 - 5(3) + 1$

$= -2(9) - 5(3) + 1$

$= -18 - 15 + 1 = \boxed{-32}$

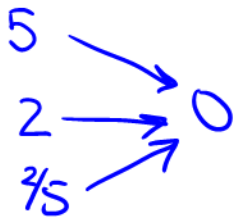
Example 4: Determine which of the following sets represents a function.

$\{(2,2),(2,5),(\frac{2}{5},0)\}$ No



$\{(2,2),(5,2),(\frac{2}{5},0)\}$ Yes

$\{(5,0),(2,0),(\frac{2}{5},0)\}$ Yes



Example 5: Find the domain of the functions.

$f(x) = \frac{13}{x-5}$

$x-5=0$
$+5 \quad +5$
$x=5$

Domain: $(-\infty,5)\cup(5,\infty)$

$g(x) = \frac{x+3}{x+4}$

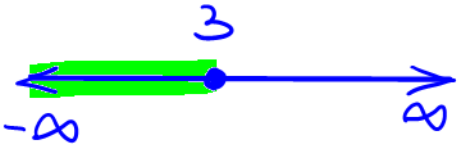
$x+4=0$
$-4 \quad -4$
$x=-4$

$\frac{0}{\text{anything}} = 0$

Domain: $(-\infty,-4)\cup(-4,\infty)$

$h(x) = \sqrt{24-8x}$

$24-8x \geq 0$
$-24 \quad -24$
$-8x \geq -24$ flip
$\frac{-8x}{-8} \leq \frac{-24}{-8}$
$x \leq 3$



$(-\infty,3]$

Example 6: State whether the following lines are parallel, perpendicular, or neither.

$y = 3x - 6$

$3x - y = 12$

$-3x \quad -3x$

$-y = -3x + 12$

$-1 \quad -1 \quad -1$

$y = 3x - 12$

parallel

$m_1 = m_2 \Rightarrow$ lines are parallel

$m_1 = m_2$, $b_1 = b_2 \Rightarrow$ same line

$m_1 \cdot m_2 = -1 \Rightarrow$ lines are perpendicular

$y - 4x = 9$

$y + \frac{x}{4} = 12$

$y - 4x = 9$

$+4x \quad +4x$

$y = 4x + 9$

$y + \frac{x}{4} = 12$

$-\frac{x}{4} \quad -\frac{x}{4}$

$y = -\frac{1}{4}x + 12$

$4\left(-\frac{1}{4}\right) = -1$ ✓

lines are perp.

$4y = 7x + 10$

$y - 6 = -\frac{4}{7}x$

$\frac{4y}{4} = \frac{7x}{4} + \frac{10}{4}$

$y - 6 = -\frac{4}{7}x$

$+6 \quad +6$

$y = \frac{7}{4}x + \frac{10}{4}$

$y = -\frac{4}{7}x + 6$

$y = \frac{7}{4}x + \frac{5}{2}$

slope

$\left(\frac{7}{4}\right)\left(-\frac{4}{7}\right) = -1$

lines are perp.

Example 7: Write the equation for the line that has -7/8 and y-intercept -3/4.

$m = -7/8$

$y\text{-int.} = -\frac{3}{4}$

$y = -\frac{7}{8}x + \left(-\frac{3}{4}\right)$

$y = -\frac{7}{8}x - \frac{3}{4}$

Slope-intercept

$y = mx + b$, m = slope, b = y-int.

Point-slope

$y - y_1 = m(x - x_1)$, m = slope, (x_1, y_1) = point

$8y = -7x - 6$

$+7x \quad +7x$

$7x + 8y = -6$

Standard form

$Ax + By = C$

Example 8: Give the equation for a line in slope intercept form that passes through (-1,7) and (-1/5, -2).

$x_1\ y_1 \quad x_2\ y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-2-7}{-\frac{1}{5}-(-1)} = \frac{-9}{\frac{-1}{5}+1} = \frac{-9}{\frac{4}{5}} = -9 \div \frac{4}{5}$

$= -9 \cdot \frac{5}{4}$

$= \frac{-45}{4}$

$-\frac{1}{5} + \frac{1.5}{1.5} = \frac{-1+5}{5} = \frac{4}{5}$

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

$y - 7 = \frac{-45}{4}(x - (-1))$

$y - 7 = \frac{-45}{4}(x+1)$

$y - 7 = -\frac{45}{4}x - \frac{45}{4}$

$+7 \qquad +7$

$y = -\frac{45}{4}x - \frac{45}{4} + \frac{7 \cdot 4}{1 \cdot 4}$

$y = -\frac{45}{4}x + \frac{-45+28}{4}$

$y = -\frac{45}{4}x - \frac{17}{4}$

Example 9: Write an equation for the line that passes through the point (-3, 4) and is

Parallel to the line $2x + 3y = -6$

$2x + 3y = -6$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x}{3} - \frac{6}{3}$

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

$m = -\frac{2}{3} \quad (x_1, y_1) = (-3, 4)$

$y - 4 = -\frac{2}{3}(x - (-3))$

$y - 4 = -\frac{2}{3}(x+3)$

$y - 4 = -\frac{2}{3}x - 2$

$+4 \qquad +4$

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

Perpendicular to the line $2x + 3y = -6$

$(x_1, y_1) = (-3, 4)$

$m_1 = -\frac{2}{3} \qquad m = -\left(-\frac{3}{2}\right) = \frac{3}{2}$

$y - 4 = \frac{3}{2}(x - (-3))$

$y - 4 = \frac{3}{2}(x+3)$

$y - 4 = \frac{3}{2}x + \frac{9}{2}$

$+4 \qquad +4$

$y = \frac{3}{2}x + \frac{9}{2} + \frac{4 \cdot 2}{1 \cdot 2}$

$y = \frac{3}{2}x + \frac{9}{2} + \frac{8}{2}$

$y = \frac{3}{2}x + \frac{17}{2}$