MATH 5071 - Problem Set 11

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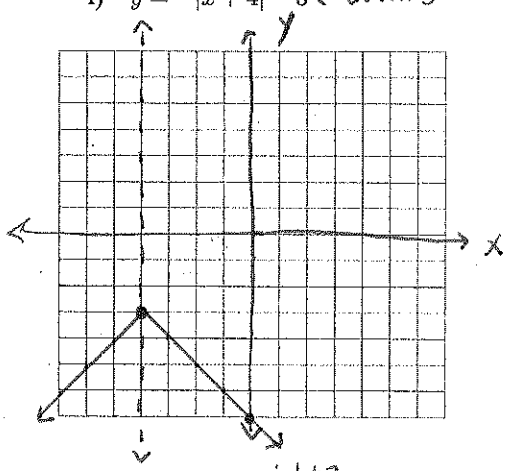
1) For the following absolute value functions, find: a. the coordinates of the vertex, b. the equation for the line of symmetry, c. the x-intercepts, d. the y-intercepts, e. whether the vertex is a max. or min., f. the domain, g. the range, and then h. graph the function.

i) $y = -|x + 4| - 3$ ← down 3

left 4



(a) $(-4, -3)$

(b) $x = -4$

(c) none

(d) $(0, -7)$ $\quad y = -|0+4| - 3 = -4 - 3 = -7$ $\quad -7 = -|0+4| - 3 \quad -7 = -7$ ✓

(e) max

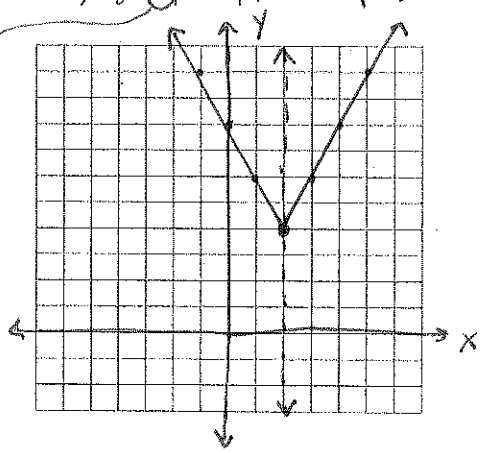
(f) $\mathbb{R}$ or $(-\infty, \infty)$

(g) $y \leq -3$ or $(-\infty, -3]$

ii) $y = 2|x - 2| + 4$ ← up 4

right 2

slopes of need $m = 2$ and $m = -2$ for my two lines



(a) $(2, 4)$

(b) $x = 2$

(c) none

(d) $y = 2|0 - 2| + 4 = 2(2) + 4 = 8$ $\quad (0, 8)$

(e) min

(f) $\mathbb{R}$ or $(-\infty, \infty)$

(g) $y \geq 4$ or $[4, \infty)$

2) Solve the following inequalities. Report the solution set on a number line and in interval notation.

i) $|x-20| > 5$

$x-20 > 5 \qquad x > 25$

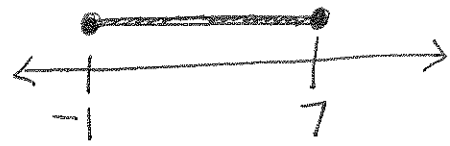
$-(x-20) > 5 \qquad x-20 < -5 \qquad x < 15$

$(-\infty, 15) \cup (25, \infty)$

ii) $|x-3| \leq 4$

$x-3 \leq 4 \qquad x \leq 7 \qquad x \leq 7$

$-(x-3) \leq 4 \qquad x-3 \geq -4 \qquad x \geq -1$

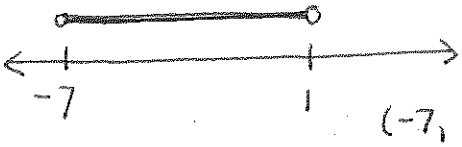


$[-1, 7]$

iii) $|3+x| - 4 < 0$

$|3+x| < 4 \qquad 3+x < 4 \qquad x < 1$

$-(3+x) < 4 \qquad 3+x > -4 \qquad x > -7$

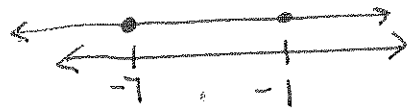


$(-7, 1)$

iv) $|x+4| \geq -3$

$x+4 \geq -3 \qquad x \geq -7$

$-(x+4) \geq -3 \qquad x+4 \leq 3 \qquad x \leq -1$



this makes sense because the absolute value of any number is positive

$\mathbb{R}$ or $(-\infty, \infty)$

v) $|x+1| < -6$

$x+1 < -6 \qquad x < -7$

$-(x+1) < -6 \qquad x+1 > 6$

$x > 5$

no overlap so no solution

this makes sense because the absolute value of any number is always positive. no way to make a negative absolute value