MTH 30

Section 2.2
~~[illegible]~~ / 2, 12, 20, 30, 42.

Solutions.

#2 graph is given find the right equation for it.

$$\boxed{g(x) = (x+1)^2 + 1.}$$

#12 find the coordinates of vertex for the parabola

$$f(x) = -2(x+4)^2 - 8.$$

recall: if $f(x) = a(x-h)^2 + k$, then (h, k) is the vertex

$h = -4$, $k = -8$

Answer: $\boxed{(-4, -8) \text{ is the vertex.}}$

#20 sketch a graph.

$$f(x) = (x-3)^2 + 2.$$

domain: $\mathbb{R}$
range: $[2, +\infty)$

a) $a = 1 > 0$ parabola opens upward

b) vertex: $\boxed{(3, 2)}$

c) y-intercept: $f(0) = 9 + 2 = 11$ $\boxed{(0, 11)}$

x-intercept: $(x-3)^2 + 2 = 0$

$\sqrt{(x-3)^2} = \cancel{\sqrt{-2}}$ $\boxed{\text{no x-intercepts}}$

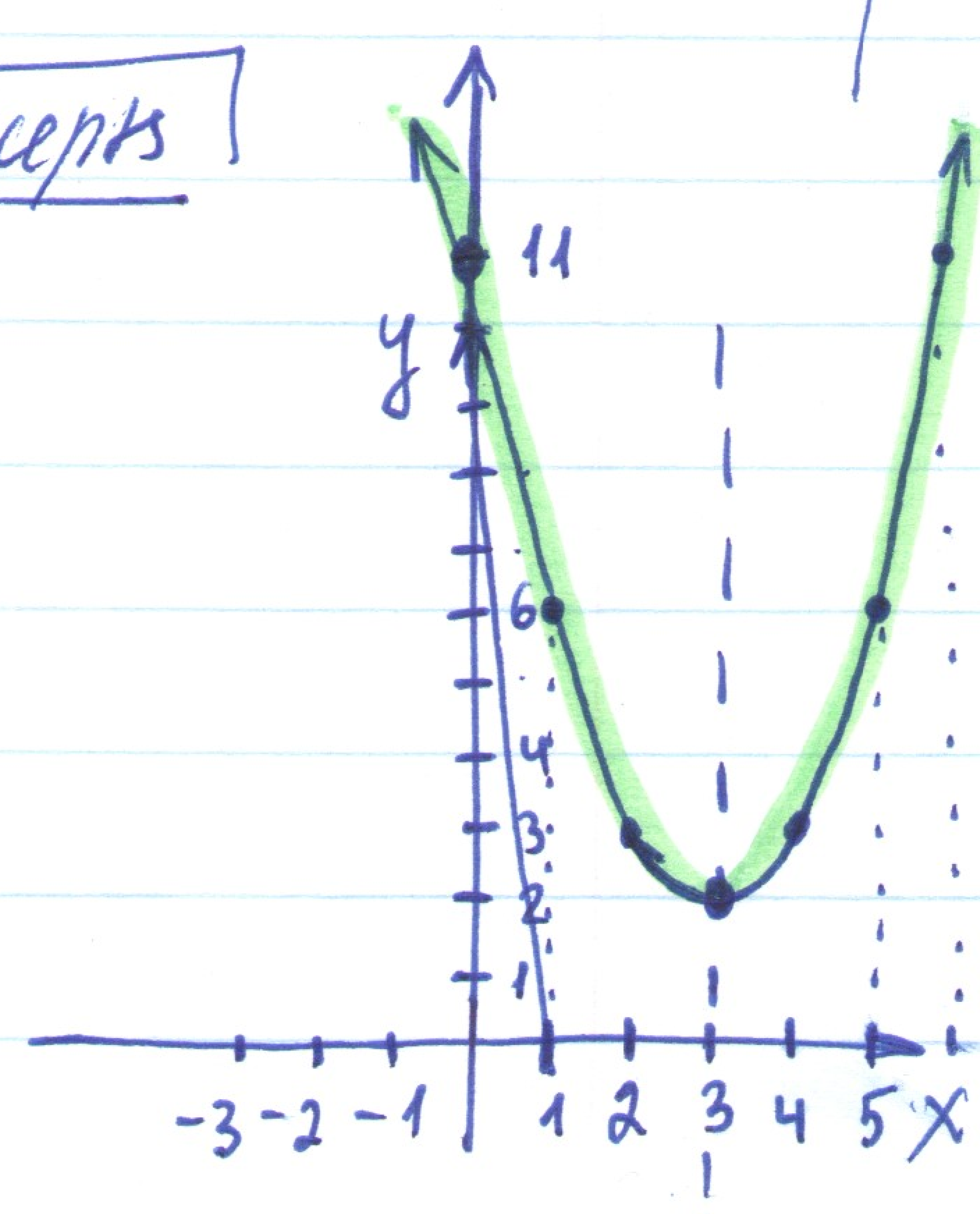
d) axis of symmetry:

$\boxed{x = 3}$

e) more info:

x	y
2	1+2=3
4	1+2=3
1	4+2=6

x	y
6	9+2=11
5	4+2=6



#30 $f(x) = \overset{a}{2}x^2 \overset{b}{-7}x \overset{c}{-4}$.

a) $a = 2 > 0$ parabola opens upward ↑

b) vertex is $\left(-\frac{b}{2a}, f\left(-\frac{b}{2a}\right)\right)$

$$f\left(-\frac{-7}{2\cdot 2}\right) = f\left(\frac{7}{4}\right) = 2\cdot\frac{7^2}{4^2} - 7\cdot\frac{7}{4} - 4 =$$

$$= \frac{49}{8} - \frac{49}{4} - 4 = -\frac{49}{8} - \frac{32}{8} = -\frac{81}{8}$$

vertex is $\boxed{\left(\frac{7}{4}, -\frac{81}{8}\right)}$ or $\approx \boxed{(1.8, -10.1)}$

c) y-intercept: $f(0) = -4$ $\boxed{(0,-4)}$

x-intercept: $2x^2 - 7x - 4 = 0$

MP $= -8$: $-8, 1$

$2x^2 - 8x + x - 4 = 0$

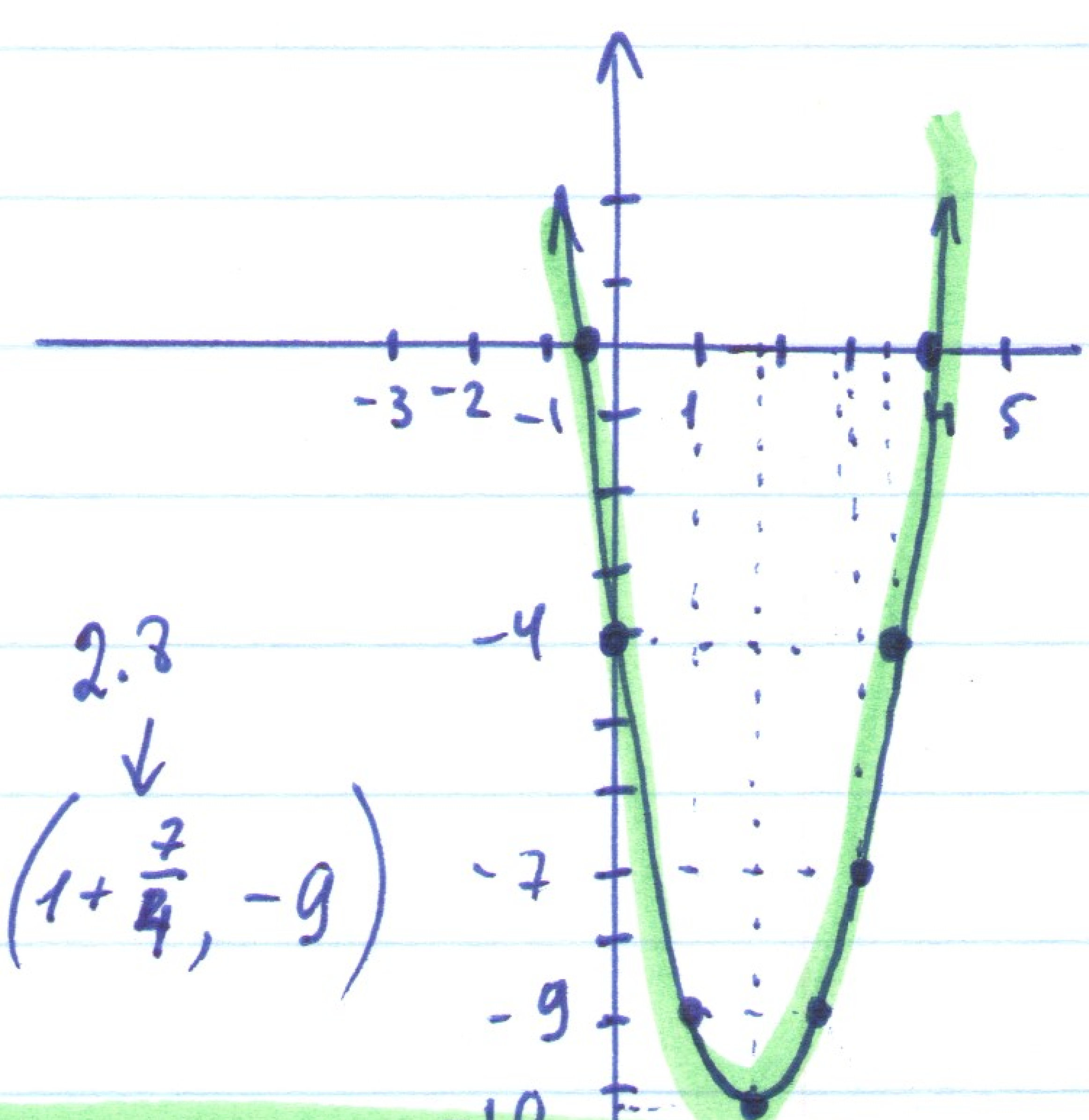
$2x(x-4) + (x-4) = 0$

$(2x+1)(x-4) = 0$

$\boxed{x = -\frac{1}{2}, 4}$

d) axis of symmetry:

$\boxed{x = \frac{7}{4}}$



e) extra info:

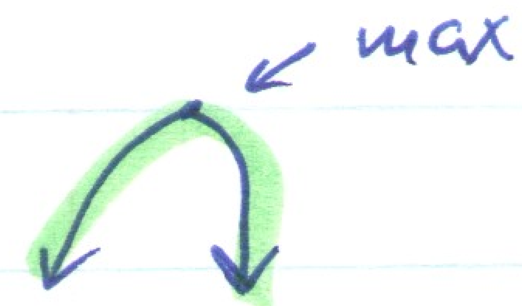
$(0,-4) \rightarrow \left(2\cdot\frac{7}{4}, -4\right) = \left(\frac{7}{2}, -4\right)$
(using symmetry)

x	y
1	$2-7-4 = -9$ → by symmetry $\left(1+\frac{7}{4}, -9\right)$ 2.7
~~4~~	~~$2\cdot 16 - 28 - 4$~~ $= 0$
3	$18 - 21 - 4 = -7$

$\boxed{\text{domain: } \mathbb{R}, \text{ range: } \left[-\frac{81}{8}, +\infty\right)}$

#42 $f(x) = -2x^2 - 12x + 3$

determine without graphing .... see the book.



a) $a = -2 < 0$ opens downward

therefore, the graph has maximum.

b) usually it occurs at vertex.

vertex: $\left(-\frac{-12}{2\cdot(-2)}, f(\ldots)\right)$

$-\frac{-12}{2\cdot(-2)} = \frac{12}{-4} = -3.$ $\quad f(-3) = -2\cdot 9 + 36 + 3 = 21.$

$\boxed{(-3, 21)}$

$\boxed{\text{maximum} = 21, \quad \text{at} \quad x = -3}$

c) $\boxed{\begin{array}{l}\text{domain: } \mathbb{R} \\ \text{range: } (-\infty, 21].\end{array}}$