9.3 Pre-Calculus Math 11

Page 497 # 3, 6, 7

3. a) dotted line so $<$ or $>$
use test point (0, 2) because it is in the shaded area

$2 \square - 0^2 - 4 \cdot 0 + 5$
$2 \square - 0 - 0 + 5$
$2 \boxed{<} \; 5$

it has to be $<$ to make a true statement
so $y < -x^2 - 4x + 5$

b) solid line so $\leq$ or $\geq$
test point (2, 1):

$1 \square \; \frac{1}{2} \cdot 2^2 - 2 + 3$
$1 \square \; \frac{1}{2} \cdot 4 - 2 + 3$
$1 \square \; 2 - 2 + 3$
$1 \boxed{\leq} \; 3$

$y \leq \frac{1}{2}x^2 - x + 3$

c) solid line so $\leq$ or $\geq$
test point (3, 1)

$1 \square - \frac{1}{4} \cdot 3^2 - 3 + 3$
$1 \square - \frac{9}{4} - 3 + 3$
$1 \boxed{\geq} - \frac{9}{4}$

$y \geq -\frac{1}{4}x^2 - x + 3$

d) dotted line so $<$ or $>$
test point (0, 1)

$1 \square \; 4 \cdot 0^2 + 5 \cdot 0 - 6$
$1 \square \; 0 + 0 - 6$
$1 \boxed{>} \; -6$

$y > 4x^2 + 5x - 6$

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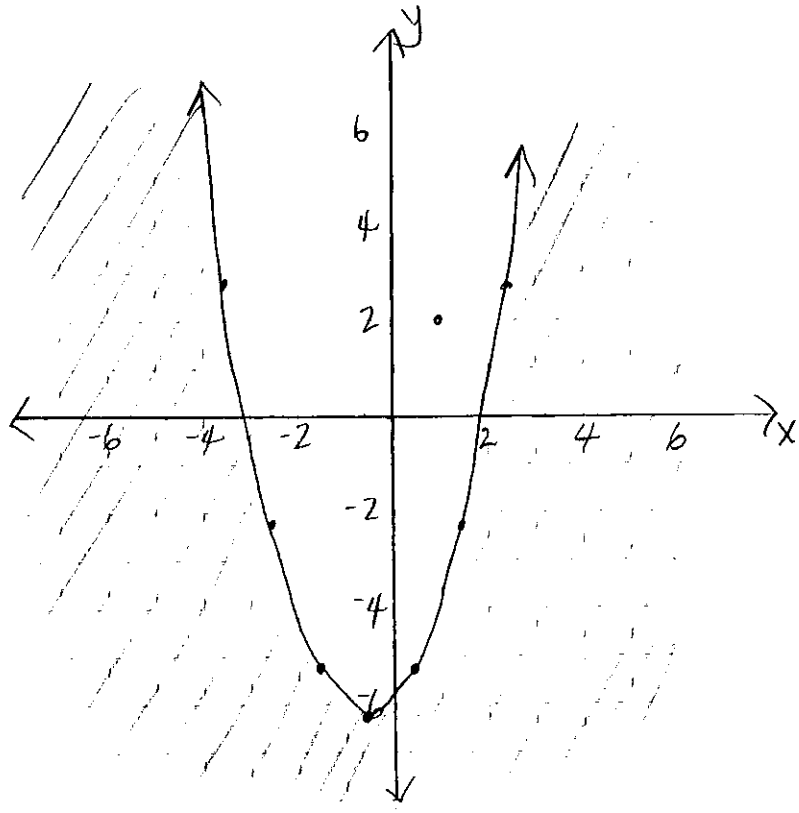
6. a) $y \leq x^2 + x - 6$

$y \leq \left(x^2 + x + \frac{1}{4} - \frac{1}{4}\right) - 6$

$y \leq \left(x^2 + x + \frac{1}{4}\right) - \frac{1}{4} - 6$

$y \leq \left(x + \frac{1}{2}\right)^2 - 6\frac{1}{4}$



test point (1, 2)

$2 \leq 1^2 + 1 - 6$

$2 \leq 1 + 1 - 6$

$2 \leq -4$

not true

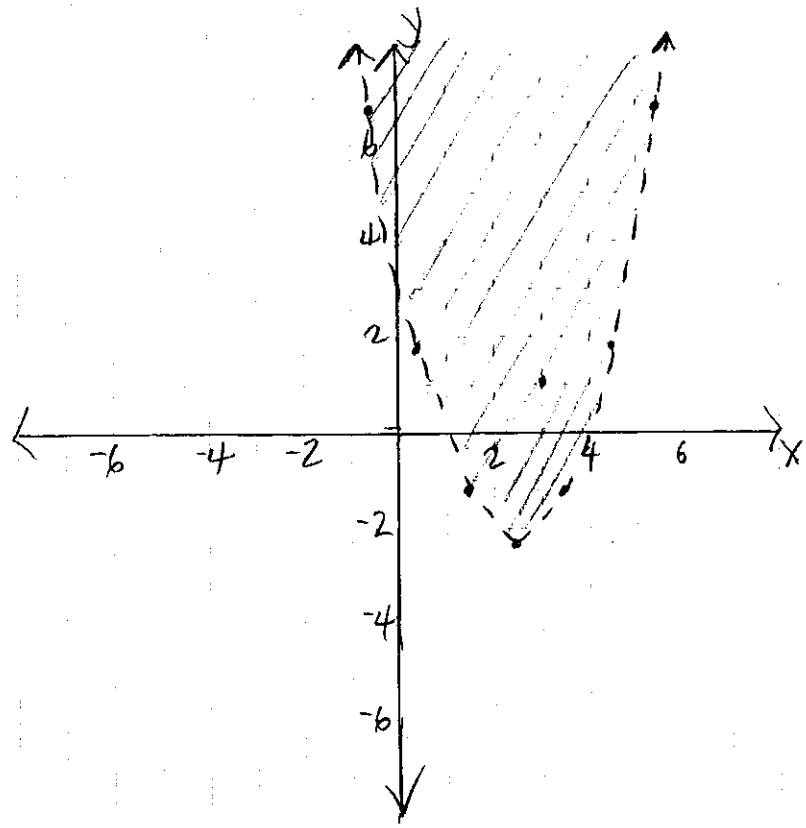
c) $y > x^2 - 5x + 4$

$y > \left(x^2 - 5x + \frac{25}{4} - \frac{25}{4}\right) + 4$

$y > \left(x^2 - 5x + \frac{25}{4}\right) - \frac{25}{4} + 4$

$y > \left(x - \frac{5}{2}\right)^2 - 6\frac{1}{4} + 4$

$y > \left(x - 2\frac{1}{2}\right)^2 - 2\frac{1}{4}$



test (3, 1)

$1 > \left(3 - 2\frac{1}{2}\right)^2 - 2\frac{1}{4}$

$1 > \left(\frac{1}{2}\right)^2 - 2\frac{1}{4}$

$1 > \frac{1}{4} - 2\frac{1}{4}$

$1 > -2$ true

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6. c) $y \geq x^2 - 6x - 16$

$y \geq (x^2 - 6x + 9 - 9) - 16$

$y \geq (x^2 - 6x + 9) - 9 - 16$

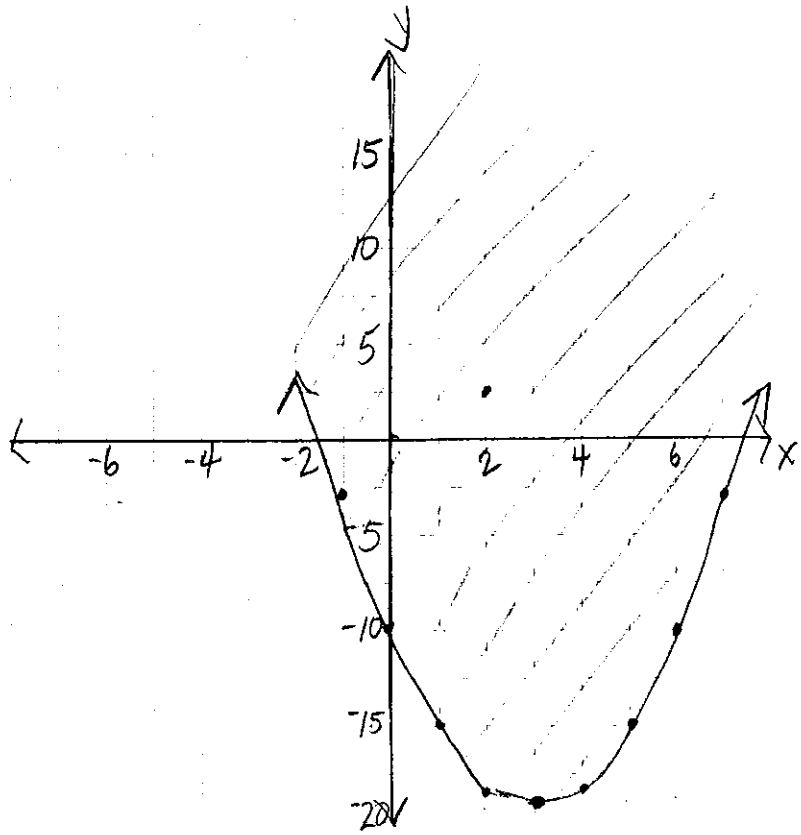
$y \geq (x-3)^2 - 25$

test point $(2, 1)$

$1 \geq 2^2 - 6 \cdot 2 - 16$

$1 \geq 4 - 8 - 16$

$1 \geq -20$ true



d) $y < x^2 + 8x + 16$

$y < (x^2 + 8x + 16 - 16) + 16$

$y < (x^2 + 8x + 16) - 16 + 16$

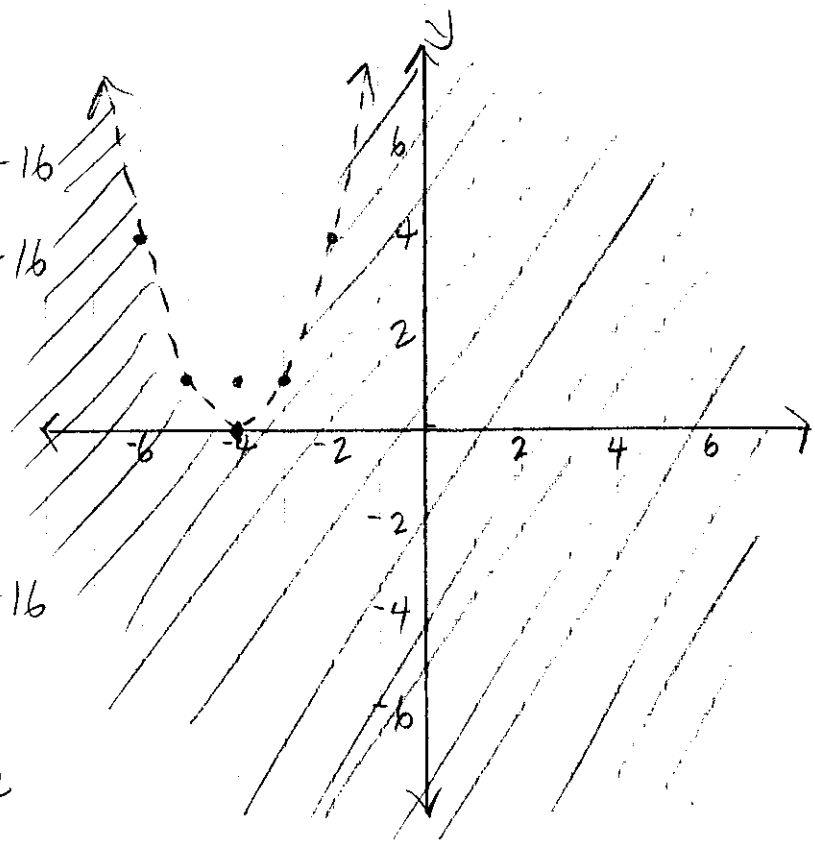
$y < (x+4)^2$

test point $(-4, 1)$

$1 < (-4)^2 + 8(-4) + 16$

$1 < 16 - 32 + 16$

$1 < 0$ not true



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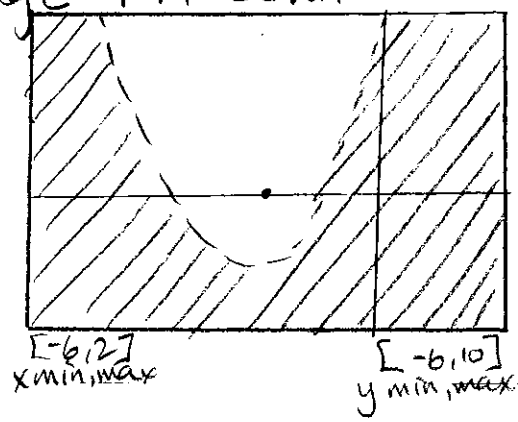
7. a)



$y = 3x^2 + 13x + 10$

test point $(-2, 0)$

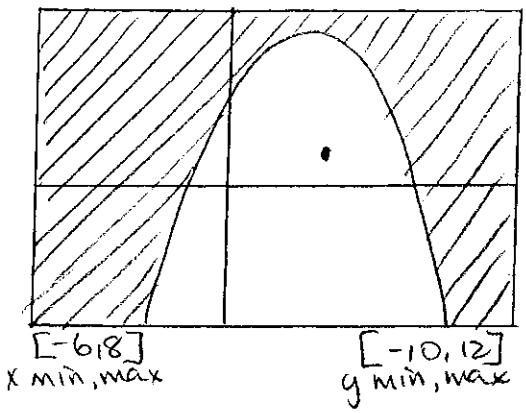
$y < 3x^2 + 13x + 10$

$0 < 3(-2)^2 + 13(-2) + 10$

$0 < 12 - 26 + 10$

$0 < -4$ not true

b)



$y = -x^2 + 4x + 7$

test point $(3, 1)$

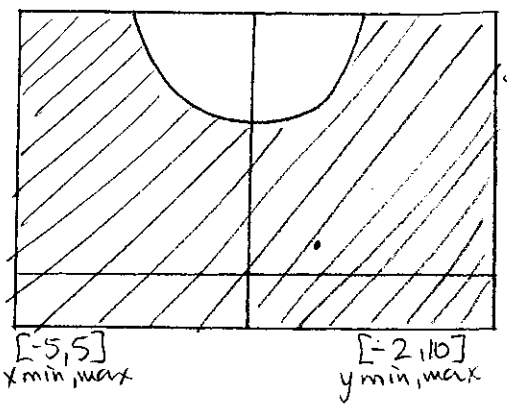
$y \geq -x^2 + 4x + 7$

$1 \geq -3^2 + 4 \cdot 3 + 7$

$1 \geq -9 + 12 + 7$

$1 \geq 10$ not true

c)



$y = x^2 + 6$

test point $(2, 1)$

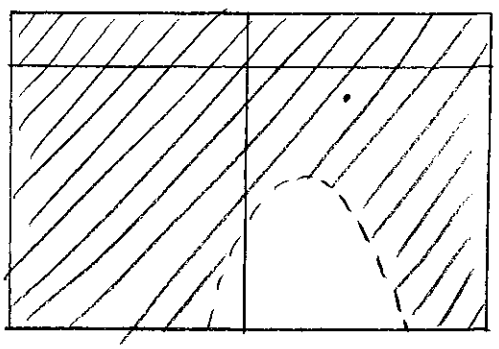
$y \leq x^2 + 6$

$1 \leq 2^2 + 6$

$1 \leq 4 + 6$

$1 \leq 10$ true

d)



$y = -2x^2 + 5x - 8$

test point $(2, -1)$

$y > -2x^2 + 5x - 8$

$-1 > -2 \cdot 2^2 + 5 \cdot 2 - 8$

$-1 > -8 + 10 - 8$

$-1 > -6$ true