Ch. 4 Closure Solutions

CL-4

106 (a) $2(y-1)^2 + 8 = 80$

$-8 \quad -8$

$2(y-1)^2 = 72$

divide by 2

$(y-1)^2 = 36$

$\sqrt{\quad} \quad \sqrt{\quad}$

$y - 1 = \pm 6$

$y - 1 = 6$ $\quad +1 \quad +1$ $\qquad$ $y - 1 = -6$ $\quad +1 \quad +1$

$y = 7 \qquad y = -5$

(b) $\sqrt{1-2x} = 10$

square both sides

$1 - 2x = 100$

$-1 \quad -1$

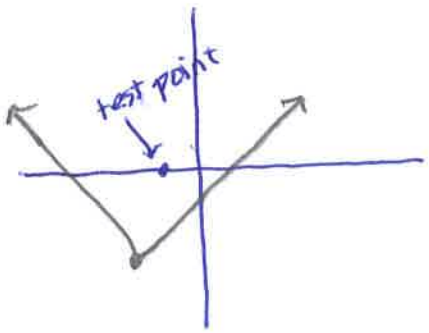
$-2x = 99$

$x = -\frac{99}{2}$

or -49.5

(c) $y \geq |x+2| - 3$

two variables so solution must be shown ON a plane

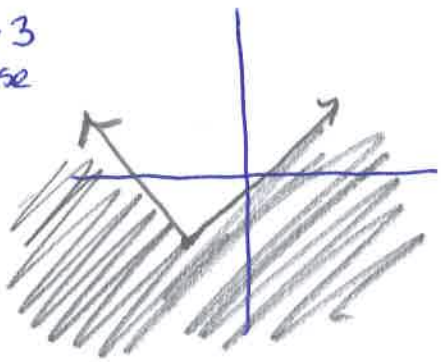


I'll test $(-2, 0)$

$0 \geq |-2+2| - 3$

$0 \geq -3$

false



107 a. $y = \frac{1}{3}x^2 + 1$

$y = 2x - 2$ ← substitute

$2x - 2 = \frac{1}{3}x^2 + 1$ ← multiply all terms by 3

$6x - 6 = x^2 + 3$

set equal to 0

$0 = x^2 - 6x + 9$

$0 = (x-3)(x-3)$

$x - 3 = 0$

$x = 3$

$y = 2(3) - 2 = 4$

$(3, 4)$

A line intersects a parabola at (3,4) so the line is tangent to the parabola there

107 b

$y = \sqrt{x-3}$

$y = x-5$ ← substitute

$x - 5 = \sqrt{x-3}$ ← square both sides

radical equations can have extraneous solutions so be sure to check answers.

$(x-5)^2 = x-3$

$(x-5)(x-5) = x-3$

$x^2 - 5x - 5x + 25 = x-3$

$x^2 - 11x + 28 = 0$

$(x-7)(x-4) = 0$

$x = 7 \quad x = 4$

$(7) - 5 = \sqrt{7-3}$

$2 = \sqrt{4}$

$2 = 2$ ✓

$4 - 5 = \sqrt{4-3}$

$-1 = \sqrt{1}$

$-1 = 1$

nope

So 4 is extraneous

So, a line intersects a square root function at $(7, 2)$

$y = 7 - 5 = 2$

108

l = cost of lemon pie

B = cost of blueberry pie

two lemon cost less 3 less than 4 blueberry: $2l = 4B - 3$

3 lemon cost 9 more than 3 blueberry: $3l = 3B + 9$

I'll use substitution:

$\frac{3l}{3} = \frac{3B+9}{3}$

$l = B + 3$

$2l = 4B - 3$

$2(B+3) = 4B - 3$

$2B + 6 = 4B - 3$

$-2B \quad -2B$

$6 = 2B - 3$

$+3 \quad +3$

$2B = 9$

$B = \frac{9}{2} = 4.50$

$l = 4.50 + 3$

$= 7.50$

So Blueberry Pies cost $4.50 and lemon cost $7.50

110a $x^2 - 2x - 15 < 0$

one variable so solution can be shown on a number line

Find boundary points

$x^2 - 2x - 15 = 0$

$(x+3)(x-5) = 0$

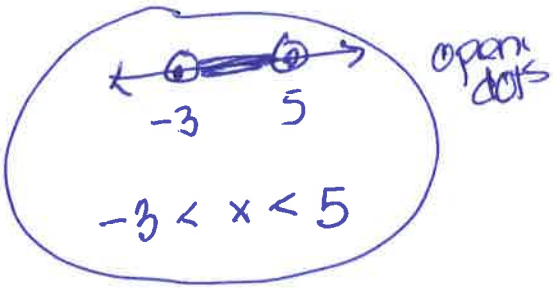
$x = -3 \quad x = 5$

Test $x = 0$

$0^2 - 2(0) - 15 < 0$

$-15 < 0$

true



$-3 < x < 5$

110b $|3x-2| \geq 10$

find boundary points $|3x-2| = 10$

$3x - 2 = 10$ $\quad +2 \quad +2$

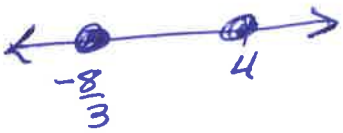
$3x = 12$

$x = 4$

$3x - 2 = -10$ $\quad +2 \quad +2$

$3x = -8$

$x = -\frac{8}{3}$

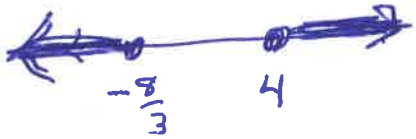


TEST $x = 0$

$|3(0)-2| \geq 10$

$|-2| \geq 10$

$2 \geq 10$ false



$-\infty < x \leq -\frac{8}{3}$, $4 \leq \infty$

111a $(6,1)\ (-10,-7)$

$\text{slope} = \frac{y-y}{x-x} = \frac{1-(-7)}{6-(-10)} = \frac{1+7}{6+10} = \frac{8}{16} = \frac{1}{2}$

I'll use $(6,1)$

$y = mx + b$

$1 = \frac{1}{2}(6) + b$

$1 = 3 + b$

$-3 \quad -3$

$b = -2$

$y = \frac{1}{2}x - 2$

112 a $2y^2 + 3y = 7$

$2y^2 + 3y - 7 = 0$

Use Quad Form

$a = 2$
$b = 3$
$c = -7$

$$x = \frac{-(3) \pm \sqrt{(3)^2 - 4(2)(-7)}}{2(2)}$$

$$x = \frac{-3 \pm \sqrt{65}}{4}$$

112 b $3(2x - y) + 12 = 4x - 3$

$6x - 3y + 12 = 4x - 3$
$-6x \qquad\qquad -6x$

$-3y + 12 = -2x - 3$
$\qquad -12 \qquad\quad -12$

$$\frac{-3y}{-3} = \frac{-2x}{-3} - \frac{15}{-3}$$

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

113 b $\dfrac{x^2-9}{x^3+6x+9} \div \dfrac{x^2-x-6}{x^2+4} = \dfrac{(x+3)(x-3)}{(x+3)(x+3)} \div \dfrac{(x-3)(x+2)}{x^2+4} = \dfrac{x-3}{x+3} \cdot \dfrac{x^2+4}{(x-3)(x+2)}$

$x^2 + 4$ can't be factored

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

113 c $6 + \dfrac{3}{x+1} \rightarrow \dfrac{6(x+1)}{(x+1)} + \dfrac{3}{x+1} \rightarrow$ condense to one fraction $\rightarrow \dfrac{6(x+1)+3}{x+1} \rightarrow \dfrac{6x+9}{x+1}$

common denom will be $x+1$

113 d $\dfrac{5}{x} - \dfrac{10}{x^2+2x} \rightarrow \dfrac{5}{x} - \dfrac{10}{x(x+2)} \rightarrow \dfrac{5(x+2)}{x(x+2)} - \dfrac{10}{x(x+2)}$

factor x^2+2x

common denominator will be $x(x+2)$

↓ condense to single fraction

$$\frac{5(x+2) - 10}{x(x+2)}$$

remember ya can't cancel anything yet

$$\frac{5x+10-10}{x(x+2)} \leftarrow \frac{5x}{x(x+2)} \leftarrow \frac{5}{x+2}$$

answer