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

$(y-1)^2=36$

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

$y-1=\pm 6$

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

$+1 \quad +1 \qquad +1 \quad +1$

$y=7 \qquad y=-5$

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

square both sides

$1-2x=100$

$-1 \qquad -1$

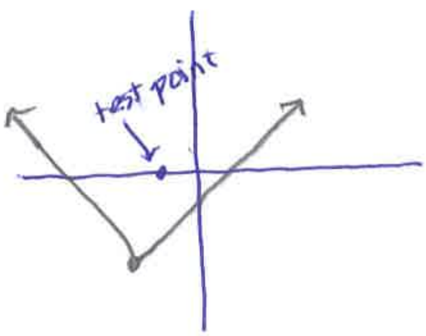
$-2x=-99$

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

or -49.5

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

two variables so solution must be shown on a plane

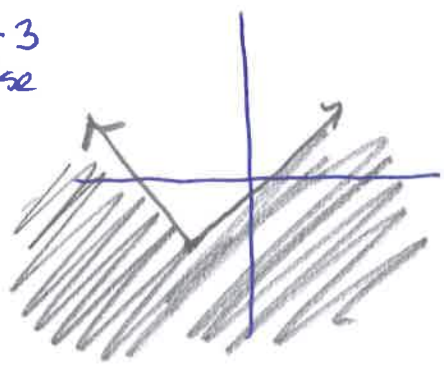


I'll test $(-2,0)$

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

$0 \geq -3$

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

$\boxed{107\ b}$

$y = \sqrt{x-3}$

$y = x-5$

Substitute

$x-5 = \sqrt{x-3}$ ← radical equations can have extraneous solutions so be sure to check answers.

square both sides

↓

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

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

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

↓

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

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

↓ ↓

$x=7$ $x=4$

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

$2 = \sqrt{4}$

$2 = 2$

✓

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

$-1 = \sqrt{1}$

$-1 = 1$

nope

So 4 is extraneous

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

↑

$y = 7-5 = 2$

$\boxed{108}$

ℓ = cost of lemon pie

B = cost of blueberry pie

two lemon costs 3 less than 4 blueberry: $2\ell = 4B - 3$

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

I'll use substitution!

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

$\ell = B + 3$

$2\ell = 4B - 3$

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

$2B + 6 = 4B - 3$

$-2B \quad -2B$

$6 = 2B - 3$

$+3 \quad +3$

$2B = 9$

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

$\ell = 4.50 + 3$

$= 7.50$

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

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

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

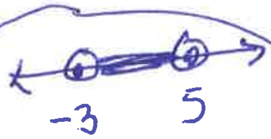
$x = -3 \quad x = 5$

Test $x = 0$

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

$-15 < 0$

true



open dots

$-3 < x < 5$

110b

$|3x-2| \geq 10$

find boundary points

$|3x-2| = 10$

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

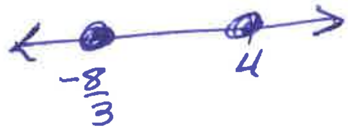
$3x = 12$

$x = 4$

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

$3x = -8$

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

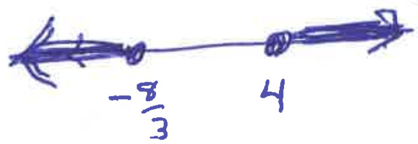


Test $x = 0$

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

$|-2| \geq 10$

$2 \geq 10$ 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 $(6,1)$

$y = mx + b$

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

$1 = 3 + b$
$-3 \quad -3$

$b = -2$

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

$\boxed{112a}$

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

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

Use Quad Form

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

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

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

$\boxed{112b}$

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

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

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

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

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

$\boxed{113b}$

$$\frac{x^2-9}{x^2+6x+9} \div \frac{x^2-x-6}{x^2+4} = \frac{\cancel{(x+3)}(x-3)}{\cancel{(x+3)}(x+3)} \div \frac{(x-3)(x+2)}{x^2+4} = \frac{\cancel{x-3}}{x+3} \cdot \frac{x^2+4}{\cancel{(x-3)}(x+2)}$$

can't be factored

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

$\boxed{113c}$

$$6 + \frac{3}{x+1} \rightarrow \frac{6(x+1)}{(x+1)} + \frac{3}{x+1} \rightarrow \frac{6(x+1)+3}{x+1} \rightarrow \boxed{\frac{6x+9}{x+1}}$$

common denom will be $x+1$

condense to one fraction

$\boxed{113d}$

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

factor

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

condense to a single fraction

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

remember you can't cancel anything yet

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

answer