

KEY

Name.

1. (20pts) A dieter is allowed 140 calories for a snack. Apricots contain 20 calories each, and tangerines contain 35 calories. She wants no more than 2 tangerines for a snack. Let x = the number of apricots and y = the number of tangerines for a snack.

- Write a system of linear inequalities to describe the possible numbers of each item the dieter can eat.
- Graph and show the solution set. Label the corner point.

ITEM	Q	R	Q · R
APRICOTS	x	20	20x
TAMBERINES	y	35	35y
TOTALS			$20x + 35y$ $\leq$ 140

TRANSLATES TO: $y \leq 2$

SYSTEM

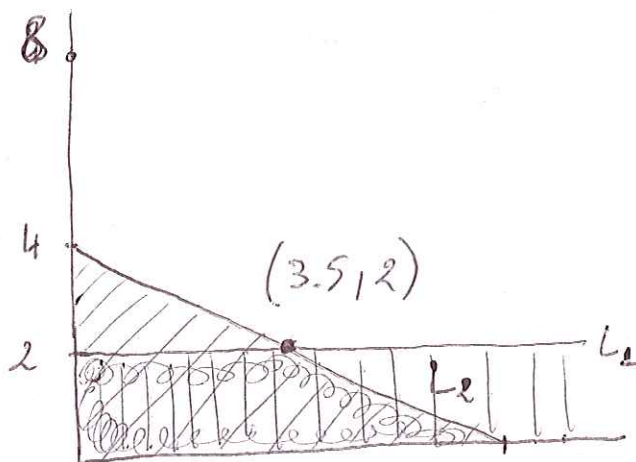
$$\begin{cases} Y \leq 2 \\ 20X + 35Y \leq 140 \end{cases} \quad \begin{array}{l} -20X \\ -20X \end{array} \quad \begin{array}{l} -0 \\ -0 \end{array} \quad \begin{array}{l} 35Y \leq \frac{-20X + 140}{35} \end{array}$$

$$L_1: \begin{cases} Y \leq 2 \\ Y \leq -\frac{4}{7}X + 4 \end{cases}$$

ADD THE INEQUALITIES

$$\begin{cases} x \geq 0 \\ y \geq 0 \end{cases} \quad \text{From the context,}$$

ACCORDING TO WHICH WE ONLY PICTURE THE "POSITIVE AXIS".



CORNER POINT: PLUG $y=2$ IN LINE 2:

$$\begin{array}{r} 2 = -\frac{4}{7}x + 4 \\ -4 \end{array} \rightarrow \begin{array}{r} -2 = -\frac{4}{7}x \\ -4/7 \end{array} \rightarrow x = \frac{7}{2} = 3.5$$

2. (15pts) Graph and show the solution set and label the corner point for the system of inequalities

$$\begin{cases} x - y \geq 1 \\ y > 2x - 1 \end{cases} \rightarrow \begin{cases} -y \geq -x + 1 \\ y > 2x - 1 \end{cases} \rightarrow \begin{cases} y \leq x - 1 \\ y > 2x - 1 \end{cases}$$

$$L_1: y \leq x - 1$$

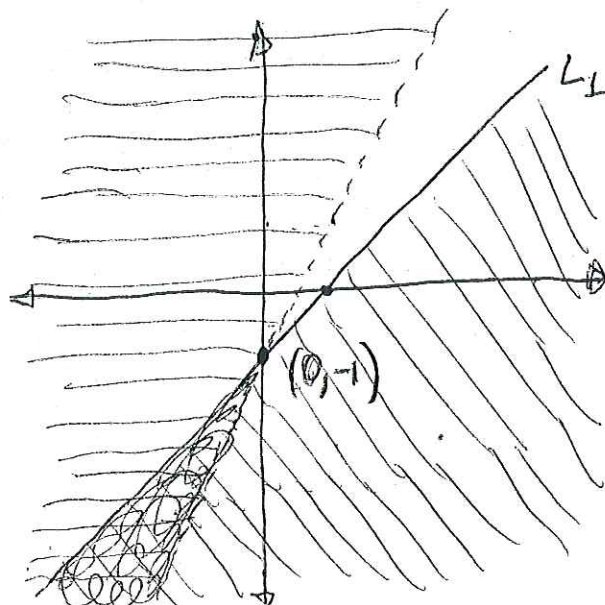
$$L_2: y > 2x - 1$$

CORNER POINT: PLUG L_1 IN L_2 :

$$x - 1 = 2x - 1 \rightarrow 0 = -x$$

$$\rightarrow x = 0 \xrightarrow{\text{PLUG IN } L_1} y = 0 - 1 = -1$$

CORNER POINT: $(0, -1)$



3. (7pts) Combine like terms of the following polynomial. Arrange the terms alphabetically, with exponents on the first variable in descending order.

$$-9y^2 + 3xy + x^2 - 3xy$$

$$x^2 + 3xy - 3xy - 9y^2$$

$$x^2 - 9y^2$$

4. Expand the following polynomials and combine like terms:

(a) (13pts) $(x - 1)(x + 7)$

$$x(x + 7) + (-1)(x + 7)$$

$$x^2 + 7x - x - 7$$

$$\boxed{x^2 + 6x - 7}$$

(b) (13pts) $3(x - 2)^2$

$$3(x - 2)(x - 2) = (3x - 6)(x - 2) = (3x)(x - 2) + (-6)(x - 2)$$

$$3x^2 + 3x(-2) - 6x + (-6)(-2) = 3x^2 - 6x - 6x + 12$$

$$\boxed{3x^2 - 12x + 12}$$

5. Simplify the following expressions. Leave your answer without denominators.

(a) (13pts) $10^{-4} \cdot 10^6$

$$10^{-4+6} = \boxed{10^2} (= 100)$$

(b) (13pts) $\frac{a^3b^{-2}}{a^{-1}b}$

$$a^{3-(-1)} b^{-2-1}$$

$$a^{3+1} b^{-3}$$

$$\boxed{a^4 b^{-3}}$$