Part A No calculators allowed on Part A.

1. Given the quadratic function $y = -x^2 + 6x - 8$,

(a). Find the (x, y) coordinate of the vertex; Is it a maximum or a minimum? $(3, 1);$ maximum

(b). Find the x- and y- intercepts, if they exist. x-int : $(2, 0), (4, 0);$ y-int : $(0, -8)$

(c). Graph the function (w/o calculator). Label the vertex and intercepts.

Part B You may use a calculator on Part B.

2. Solve the following systems of linear equations algebraically. Show all your work. If the system is dependent or inconsistent, clearly state so.

(a). $\begin{cases} 3x + 2y = 3 \\ -x + 5y = 16 \end{cases}$ **(b).** $\begin{cases} 2x - 6y = 10 \\ -3x + 9y = -15 \end{cases}$ **(c).** $\begin{cases} x + 3y - 8z = 20 \\ y - 3z = 11 \\ 2y + 7z = -4 \end{cases}$

(a). $(-1, 3)$ **(b).** dependent **(c).** $x = -11, y = 5, z = -2$

3. A customer buys a blend of two coffees in the coffee shop: Kenyan, costing \$8.50 per pound and Jamaican Blue Mountain, costing \$14.60 per pound. He buys 3 pounds of the coffee blend which costs him \$31.55. How many pounds of each kind of coffee went into the mixture? 2.01 lbs of Kenyan; 0.99 lbs of Jamaican Blue

4. Solve the following equations

(a). by factoring: **(i).** $4x^2 - 25 = 0$ Ans: $x = \frac{5}{2}, -\frac{5}{2}$ **(ii).** $2x^2 - 12 = x^2 + x$ Ans: $x = 4, -3$

(d). by using the quadratic formula: **(i).** $4x^2 - 25 = 0$ Ans: $x = \frac{5}{2}, -\frac{5}{2}$ **(ii).** $9x^2 - 12x + 4 = 0$ Ans: $x = \frac{2}{3}$

(g). by any method you choose: **(i).** $2x^2 - 7x - 4 = 0$ Ans: $x = 4, -\frac{1}{2}$ **(ii).** $(x - 3)(1 - x) = -3$ Ans: $x = 0, 4$

5. Given the function $y = 32 - 2x^2$

(a). Find the x and y coordinate of the vertex. Is it is a maximum or minimum? $(0, 32)$ is a maximum

(b). Find the x- and y-intercepts. y-int: $(0, 32);$ x-int: $(4, 0), (-4, 0)$ **(c).** Sketch the graph.

6. If the profit from the sale of x number of stereos is given by $P = 90x - 200 - x^2$,

(a). How many units must be sold to obtain a profit of 1200? 20 or 70 stereos

(b). How many units must be sold to maximize profit? 45 stereos

(c). What is the maximum profit? \$1825

7. Find the equation of the parabola through the points $(0, -3)$ $(1, 4)$ $(-1, -6)$ $y = 2x^2 + 5x - 3$

8. Solve the following inequalities. Write your answers in interval notation and graph it on the number line.
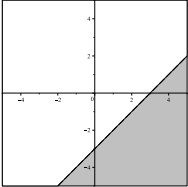
(a). $2x + 1 > 4$ $(\frac{3}{2}, \infty)$ **(b).** $2(7x - 3) \le 12x + 16$ $(-\infty, 11]$

9. The percentage of adults who smoke cigarettes can be modeled by the equation $p = 43.3 - 0.504t$ where t is the number of years past 1960.
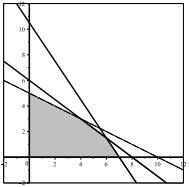
(a). What percent does this model predict for 2013? [Hint: What value of t represents 2013?] 16.59%

(b). In which year does the model predict that the percentage of adults who smoke cigarettes will be less than 10%. 2027

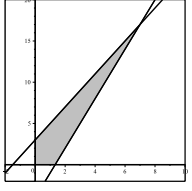**10.** Graph the solution region for each of the following.

(a). $3(x + y) < 6x - 9$

(b). $\begin{cases} x & + & 2y & < & 10 \\ 3x & + & 4y & \leq & 24 \\ 3x & + & 2y & \leq & 21 \\ & & x & \geq & 0 \\ & & y & \geq & 0 \end{cases}$

11. Graph the solution region for the given system of inequalities. Find the corners.

$\begin{cases} 3x & - & y & \leq & 4 \\ 2x & - & y & \geq & -3 \\ & & x & \geq & 0 \\ & & y & \geq & 0 \end{cases}$

Corners: $(0,0), (0,3), (4/3,0), (7,17)$

12. Given the system of inequalities $\begin{cases} x + 4y & \geq & 10 \\ 2x + 6y & \geq & 18 \\ x & \geq & 0 \\ y & \geq & 0 \end{cases}$

(a). Shade the feasible region   **(b).** Find the corners $(0,3), (10,0), (6,1)$
(c). Minimize $f = 3x + 2y$ subject to the same constraints   Minimum of 6 at $(0,3)$.

13. Solve the following inequality. Graph the solution on the number line.

(a). $x^2 - x - 6 \leq 0$ $[-2, 3]$ **(b).** $\dfrac{(x-3)^2}{(x+1)(x+2)} \geq 0$ $(-\infty, -2) \cup (-1, \infty)$