COLLEGE ALGEBRA

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GPS # 11 — 2.1 QUADRATIC FUNCTIONS; PARABOLAS — Class Time: T/Th 11:30 Date: 1-31-08

Useful Guidelines:

* Quadratic Function: $f(x) = ax^2 + bx + c, (a \neq 0)$, where a, b and c are real numbers.
* The vertex of the graph of $f(x) = ax^2 + bx + c, (a \neq 0)$ has coordinates $(x, y) = \left(\frac{-b}{2a}, f\left(\frac{-b}{2a}\right)\right)$.
* The axis of symmetry of the parabola has equation $x = \frac{-b}{2a}$.
* To graph a quadratic function:
  Step 1: Determine whether the parabola opens up or down.
  Step 2: Find the vertex.
  Step 3: Find the x-intercepts (if any) and y-intercept.
  Step 4: Plot the graph. [Find additional points as needed.]

20/20 Good job!

max ∩ ∪ min

a<0 a>0

Graph each parabola, Give the vertex, axis, domain, and range.

1. a) $f(x) = x^2 - 4x + 3$

A=1, b=-4, c=3

$x = \frac{-(-4)}{2 \cdot 1} = 2$

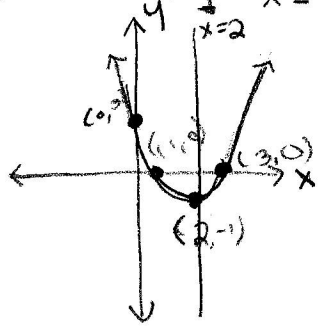
x	y
0	3

y int: $f(0) = 3$

x int: $x^2 - 4x + 3 = 0$

$(x-1)(x-3)$

$x = 1, 3$



axis: $x = 2$

$f(2) = 2^2 - 4(2) + 3$

$f(2) = -1$

vertex = (2, -1)

D: $(-\infty, \infty)$

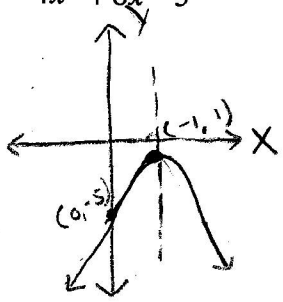
R: $[-1, \infty)$

b) $f(x) = -4x^2 + 8x - 5$

A=-4, B=8, c=-5

$x = \frac{-(8)}{2 \cdot (-4)} = \frac{-8}{-8} = 1$

x	y
0	-5



$f(1) = -4(1)^2 + 8(1) - 5$

$f(1) = -1$

Vertex (1, -1)

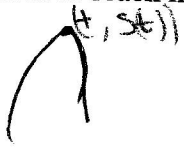
D: $(-\infty, \infty)$

R: $(-\infty, -1]$

axis: $x = 1$

2. A rocket is fired upward. After t hour, the height of the rocket is given by $S(t) = -2t^2 + 64t$. Find the time required in hours for the rocket to reach maximum height, and find the maximum height in kilometers.

A=-2, b=64, c=0



$t = \frac{-b}{2a}$

$t = \frac{-(64)}{2(-2)} = \frac{-64}{-4} =$ 16 hour

$S(16) = -2(16)^2 + 64(16)$

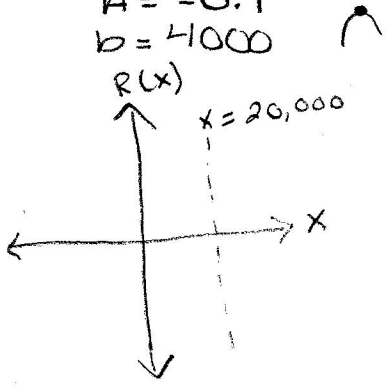
S(16) = 512 km

3. The monthly total revenue for a beverage is given by $R(x) = 4000x - 0.1x^2$ dollars, where x is the number of units sold. x = no of unit sold R(x) = total Revenue

a) To maximize the monthly revenue, how many units must be sold?

A = -0.1, b = 4000

$x = \frac{-b}{2a} = \frac{-4000}{2(-0.1)} =$ 20,000 units



b) What is the maximum possible monthly revenue?

$R(20{,}000) = -4000(20{,}000) - 0.1(20{,}000)$

R = $40,000,000