1.4 (and 4.5) + 2.1

Tuesday, June 02, 2009
7:13 AM

35.) $g(x) = .25x^2 - 1.5x - 7$

x coord. of vertex $a = .25,\ b = -1.5,\ c = -7$

$h = \frac{-b}{2a} = \frac{-(-1.5)}{2(.25)} = \frac{1.5}{.5} = 3$

y coord. of vertex.

$K = g(3) = .25(3)^2 - 1.5(3) - 7$
$= .25(9) - 4.5 - 7$
$= 2.25 - 4.5 - 7$
$= -9.25$

vtx. form

$g(x) = .25(x-3)^2 - 9.25$

x- ints. could use QF or from vtx. form

$g(x) = 0$
$.25(x-3)^2 - 9.25 = 0$

$.25(x-3)^2 = 9.25$

$(x-3)^2 = \frac{9.25}{.25}$

$(x-3)^2 = 37$

$(x-3) = \pm\sqrt{37}$

$x = 3 \pm \sqrt{37}$

vertex form:

$f(x) = a(x-h)^2 + K$

vertex coordinates are (h, K)

$f(x) = ax^2 + bx + c$

vertex has x coordinate

$x = h = \frac{-b}{2a}$

y coord:

$y = K = f\left(\frac{-b}{2a}\right)$.

y-intercept is at $y = c$

x-intercepts, if any

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

(have x-int's if $b^2 - 4ac > 0$)

if $a > 0$ parabola opens up,
$a < 0$ " " down

intcpts: $(3+\sqrt{37}, 0)$
$(3-\sqrt{37}, 0)$
$(0, -7)$

Vertex: $(3, -9.25)$

minimum of -9.25 at $x = 3$

range

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pg 293/#14) x TV's

$C(x) = 60,000 + 60x$

$p = 200 - x/50$, $0 \le x \le 10,000$

- max Revenue
- max profit (how much, prod. level)

Revenue = money in = $\underbrace{(\text{\# of units sold})}_{x}\underbrace{(\text{price per unit})}_{p}$

$R(x) = x \quad p$

$R(x) = x\left(200 - \frac{x}{50}\right)$ ← parabola opens down.

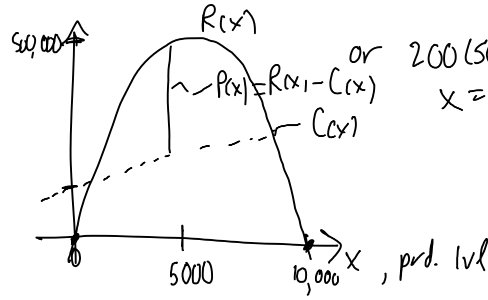
x-ints occur when

$x = 0$ or when $200 - \frac{x}{50} = 0$

$200 = \frac{x}{50}$

or $200(50) = x$

$x = 10{,}000$



x-coordinate of vtx. ($\frac{1}{2}$ way b/w x-int's)

is $x = 5{,}000$ (to max. revenue produce 5,000 TV's)

The max. rev. is $R(5000) = 5000\left(200 - \frac{5000}{50}\right) = 5000(200 - 100)$

$= \$500{,}000$

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max Profit

Profit = \$ in − \$ out

$P(x) = R(x) - C(x)$

$= x\left(200 - \frac{x}{50}\right) - (60{,}000 + 60x)$ ✓

$= 200x - \frac{x^2}{50} - 60{,}000 - 60x$ ✓

$= -\frac{x^2}{50} + 140x - 60{,}000$ ✓

parab. opens down, max. at vtx.

x coord. of vtx.

$a = \frac{-1}{50}, \quad b = +140, \quad c = -60{,}000$

$x = \frac{-b}{2a} = \frac{-(140)}{2\left(\frac{-1}{50}\right)} = \frac{140}{1/25} = (140)(25) = \cancel{3850}\ 3500$

max profit production level at $x = 3500$ TVs max profit is $P(3500) = -\left(\frac{3500^2}{50}\right) + 140(3500) - 60,000$

$\neq \cancel{675,000}\ \cancel{185,000} = -\frac{1}{50}(3500)^2 + 140(3500) - 60,000$

$= \$185,000$

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Coffee sales 1600 cups per day at \$2.40 each

Survey says for every \$.05 reduction in price an extra 50 cups will be sold.

How to max revenue? revenue = units sold * price

price	cups sold	revenue
2.40	1600	3840
2.35	1650	3877.5
2.30	1700	3910

what should x be?

x = price?

x = cups sold?

x = # of .05 price decreases

Revenue = (price) (cups sold)

$R(x) = (2.40 - .05x)(1600 + 50x)$

$= -2.5x^2 + 40x + 3840$ (downward parab)

max. revenue occurs at $x = \frac{-b}{2a} = \frac{-40}{2(-2.5)} = 8$

$x = 8$ price decreases

best price = \$2.40 − 8(.05) = \$2.00

cups sold = 1600 + 50(8) = 2000 cups

max revenue of \$4000

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§2.1 Polynomials: poly. function

$f(x) = a_n x^n + a_{n-1} x^{n-1} + a_{n-2} x^{n-2} + \dots + a_2 x^2 + a_1 x + a_0$

The a's are reals #'s and n is a positive integer

$a_n \neq 0$, n is called the degree of the poly.

$p(x) = 2x^3 + 3x - 5$ is a degree 3 poly. (cubic)

$f(x) = -2x + 3$ is degree 1 (linear)

$g(x) = 7$ is degree 0 poly. (constant)

$h(x) = \sqrt{2x^3 - 5}$ not poly.

$s(x) = \sqrt{2}\,x^5 - 3x + 7$ degree 5 poly.

$r(t) = t^3 + t^2 - \frac{1}{t} + 3$ not poly.