Advanced Math

2-1

Quadratic Functions

What is the general form of a quadratic function?

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

What is the standard form of a quadratic equation?

$F(x) = a(x-h)^2 + k$

Fat/Skinny (h,k) → vertex

up/down

What are *x*-intercepts? where a line crosses the x-axis?

How do I find them?

1) set $y = 0$
2) Calculator
   calculate – zeros

What are *y*-intercepts? line crosses y-axis

How do I find them?

1) set $x = 0$
2) Calculator
   Trace 0

What are some other names for *x*-intercepts (synonyms)?

1) zeros
2) solutions
3) roots

What are the three methods for solving quadratic equations?

1) Radical Method

$\sqrt{x^2} = \sqrt{16}$

$|x| = 4$

$x = \pm 4$

2) Factoring
3) Quadratic Formula $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$
4) Graphing Calculator

When is it advantageous to work with the general form? $F(x) = ax^2 + bx + c$

Good For intercepts

x-ints → solve

y-int → c

When is it advantageous to work with the standard form?

Good For max's and min's

(always at vertex)

The vertex of a quadratic is (h, k). How does the vertex relate to:

input → output

1) the axis of symmetry: $x = h$

2) the value of the maximum or the minimum? always k
3) the range of the function? $(-\infty, k]$ max

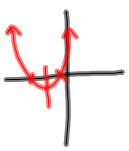
or

$[k, \infty)$ min

4) the *x*-intercepts?

h is half way between them

5) the input that causes the max or min? always h



What are the four methods of changing from the General to the Standard Form.

1) Completing the Square

2) h is halfway between the zeros.

3) Derivative

4) Graphing Calculator
Calculate max/min

What are the steps to completing the square?

1) isolate c

2) get a = 1

3) take b, half it, square it, apply to equation

What is a derivative?

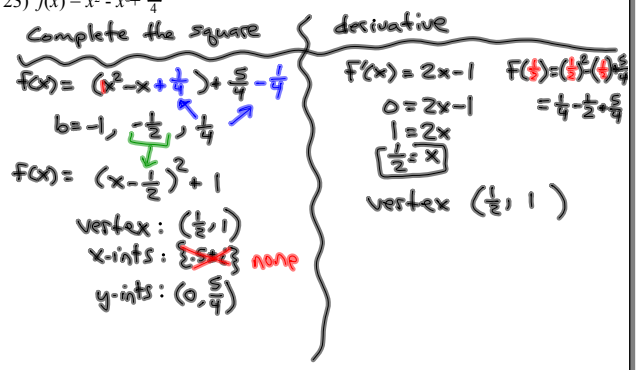
How do I find the derivative of:
1) a constant function?

2) a polynomial? a:

b: Then subtract 1 from the power.

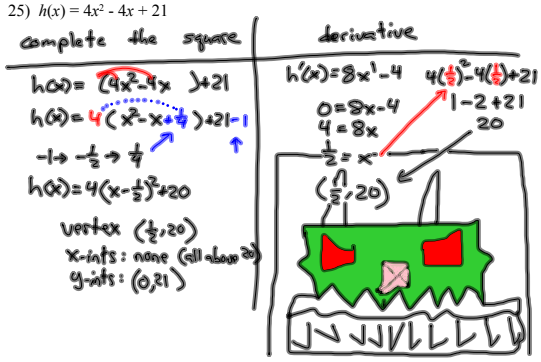
Sketch the graph of the quadratic function without the aid of a graphing utility. Identify the vertex and ~~asymptotes.~~ intercepts.

23) $f(x) = x^2 - x + \frac{5}{4}$



Sketch the graph of the quadratic function without the aid of a graphing utility. Identify the vertex and asymptotes.

25) $h(x) = 4x^2 - 4x + 21$



Find the quadratic function that has the given vertex and pass through the given point.

37) Vertex (-2,5); Point (0,9)

$F(x) = a(x-h)^2 + k$

$F(x) = a(x+2)^2 + 5$

Temp
$9 = a(0+2)^2 + 5$
$9 = 4a + 5$
$4 = 4a$
$1 = a$

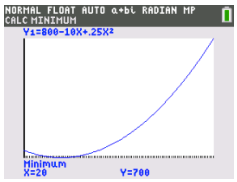
$F(x) = (x+2)^2 + 5$

67) A manufacturer of lighting fixtures has daily production costs of

$$C = 800 - 10x + 0.25x^2$$

where C is the total cost in dollars and x is the number of units produced. How many units should be produced each day to yield a minimum cost?

Vertex



$C'(x) = -10 + .5x$

$0 = -10 + .5x$

$10 = .5x$

$20 = x$

20 units

20 units

Assignment:
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1-8 all,
10 - 42 even,
64,65,68,
70-74 all, 76