PreCalc 11 - Chp 4 Review/Ref Sheet

Note Title 2015-09-24

Make sure you also have notes on the quadratic formula, completing the square, and the discriminant.

General: $y = ax^2 + bx + c$ Standard: $y = a(x-p)^2 + q$

Factored: $y = a(x-d)(x-e)$

Expression: $ax^2 + bx + c$ Equation: $ax^2 + bx + c = 0$

x-ints for exp: zeroes x-ints for equ: roots

Quadratics must have axis of symmetry (A.o.S: $x = p$), vertex (p, q), min or max value (q), y-int ($y = c$, or subst $x = 0$), domain ($x \in \mathbb{R}$), range ($y \geq q$ if $a > 0$; $y \leq q$ if $a < 0$), concavity ($a > 0$ - up; $a < 0$ - down)

Quadratics can have 0, 1, or 2 real roots - check discriminant.

Calculator: to find roots or zeroes, you are looking for x-intercepts. To find vertex, you are looking for a min or max. Practice adjusting the window to see all the features. As a starting point, use $\pm b$ as an estimate for domain, and $\pm c$ for the range.

Plotting by hand: for $a = 1$; start at vertex; 1 over & 1 up; then 1 over & 3 up; then 1 over & 5 up (by odds).

For $a \neq 1$, go up by $a \cdot$ (odds).

To determine if a table of values is given, check if the differences match the above pattern. Alternatively, do the differences of the differences and if they are constant, then it is quadratic.

Transforming $y = ax^2 \rightarrow y = a(x-p)^2 + q$

$|a| > 1$ - V stretch, $|a| < 1$ - V compress, $a < 0$ - concave down

$p > 0$ - right, $p < 0$ - left, $q > 0$ - up, $q < 0$ - down

Congruent - means same shape, but different position and rotation.

Remember to do scaling/flipping before translating.

Alternatively, do a table of values.

Determining a quadratic equation: carefully figure out which form is best. If you are given the zeroes or x-intercepts, use factored form. If you are given the vertex, use standard form. Then substitute given points for x and y, and solve for unknowns. If there are 2 unknowns, then solve for one equation and substitute.

Characteristics (or Properties): know what you can find easily from the different forms.
We can't easily find:
- Standard: x-intercepts & discriminant.
- General: vertex, x-intercepts if irrational, min/max
- Factored: vertex, x-intercepts, discriminant

We can always find a y-int by subst $x=0$.
We can always find the AoS ($x=p$): $x=(d+e)/2$ or $x=-b/2a$
Then we can find q substitute $x=p$

For modelling and word problems: know your formulas, label your variables, draw a diagram if applicable, choose where to place the axes, and determine which form works best.

Terms you should know:

Square:	x^2		
area of rectangle:	$A=lw$	product:	xy
Sum:	$x+y$	difference:	$x-y$
revenue:	$R=P\cdot U$	is:	$=$

Make sure you re-read the question so that you know what to answer. Don't forget to add units to the answer and have the correct number of decimals.

These notes are mostly strategies, write as many examples as you need!