Math 135: Intermediate Algebra
Worksheet 6
Nov 8, 2007

1. In class we said that a quadratic is anything for the form $ax^2 + bx + c$, where a, b, and c are numbers. However, there is a more general definition of a quadratic. A quadratic can be anything of the form $ax^2+bxy+cy^2$, where now x and y can be any expression. For example, the expression $2w^4+3w^2z+4z^2$ is a quadratic with $a = 2$, $b = 3$, $c = 4$, $x = w^2$, and $y = z$. For each of the following expressions, determine if it is a quadratic. If it is, what are a, b, c, x, and y?
   (a) $x^4 + 2x^2 - 15$
   (b) $2z^6 + z^2 + 4$
   (c) $2w^2 + wz^2 - 6z^4$
   (d) $4f^2 + 8fg^2 - 21g^4$
   (e) $h^4 + h^2j + j^4$
   (f) $6x^2y^4 - 13xy^2wz^2 + 6w^2z^4$
2. Factor each of the expressions in problem 1 that is a quadratic.
3. As we'll discuss more in the next class, it is possible to use factoring to solve equations. Here we'll do some examples.
   (a) Consider the equation $x^2 + 4x - 12 = 0$. Factor the left hand side.
   (b) You should now have something of the form $(x+a)(x+b) = 0$, where a and b are numbers. Notice that the left side consists of one number, $(x+a)$, multiplied by another number, $(x+b)$. The only way to multiply two numbers and get zero is if one of them is zero already. Thus, either $(x + a)$ or $(x + b)$ is 0. Use this fact to find two possible values of x in the equation you just factored.
   (c) Plug your two possible values for x into the equation from part (a) and verify that both of them work.
   (d) Repeat the process of parts (a)-(c) for the equation $x^2 - 7 + 12 = 0$.
   (e) Repeat the process for the equation $2x^2 + 5x - 12 = 0$.
   (f) Repeat the process for the equation $x^2 - 3x = 10$. (Hint: as a first step, rearrange the equation so it looks like the ones in parts (a), (c), and (d).)