MAT 121 **Writing Project #2** **Spring, 2016**

Graphing Functions by Transforming Basic Functions

FORMATTING: This is semi-formal writing, here. That means show some professionalism. You don't have to type it out, but you *do* need to be very clear. For the formatting guidelines, please see Writing Project #1.

Online Students: Bring your Writing Project with you to the testing center, and turn it in before you take the test. Don't let 'em staple your project to your test. Early Birds may mail the Writing Project to my mailing address, given in the syllabus.

Graph the function $g(x)$ by transforming the graph of a basic function, $f(x)$. At each stage you will typically have these stages:

$f(x) \to af(x) \to af(bx) \to af\left(b\left(x+\frac{c}{b}\right)\right) \to af\left(b\left(x+\frac{c}{b}\right)\right)+d$, if you use Method 1.

Method 2 follows these steps:

$f(x) \to af(x) \to af(x+c) \to af(bx+c) \to af(bx+c)+d$.

1. $g(x)=3\sqrt{6x+18}-5$
2. $g(x)=-3\sqrt{6x+18}+5$
3. $g(x)=3\sqrt{-6x+18}+5$
4. $g(x)=3\sqrt[3]{6x+18}+5$
5. $g(x)=3(6x+18)^5-5$
6. $g(x)=3\left(\frac{1}{6x+18}\right)^2-5$

We treat lines and parabolas a little differently. They come up so often - plus the completing-the-square trick – we sidestep the whole $f(bx)$ issue and just work with $g(x)=a(x-h)^2+k$ and $g(x)=m(x-h)+k$

7. $g(x)=7(x+2)-5$ (If you write this in $y=mx+b$ form, you're missing the point of these moves, and will lose points.)
8. $g(x)=7(x+2)^2-5$
9. $g(x)=x^2-6x+1$ (Requires completing the square.)
10. $g(x)=3x^2-30x+71$ (Requires completing the square.)

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

There is a cheat for obtaining $a(x-h)^2+k$. (h,k) = vertex, $h=\frac{b}{2a}$, and you plug it in to find k.

Alternatively: $g(x)=ax^2+bx+c=a\left(x+\frac{b}{2a}\right)^2+g\left(-\frac{b}{2a}\right)$, or $a\left(x-\left(\frac{-b}{2a}\right)\right)^2+g\left(\frac{-b}{2a}\right)$