MAT 121 Writing Project #2 Spring, 2023

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.

DELIVERY: Upload to Writing Project #2 Drop-Box by Friday, February 24th for full credit, OR by Thursday, March 2nd, for up to 80% credit.

Main Resources: Writing Project #2 Videos and Notes and Chapter 2 Homework Videos and Notes.

Main Method: $0.\ f(x) \Rightarrow 1.\ a\,f(x) \Rightarrow 2.\ a\,f(x+c) \Rightarrow 3.\ a\,f(bx+c) \Rightarrow 4.\ a\,f(bx+c)+d = g(x)$

Method 2: $0.\ f(x) \Rightarrow 1.\ a\,f(x) \Rightarrow 2.\ a\,f(bx) \Rightarrow 3.\ a\,f\left(b\left(x+\frac{c}{b}\right)\right) \Rightarrow 4.\ a\,f\left(b\left(x+\frac{c}{b}\right)\right)+d = g(x)$

Method 2 seems tougher for most beginners, but is more in keeping with what's ahead of you in mathematics.

Graph the function $g(x)$ by transforming the graph of a basic function, $f(x)$.

1. $g(x) = 5\sqrt{3x-21}-2$
2. $g(x) = -5\sqrt{3x-21}+2$
3. $g(x) = 5\sqrt{-3x-21}-11$
4. $g(x) = \dfrac{3}{(-2x+8)^3}+5$
5. $g(x) = 5\sqrt[5]{3x+21}-6$
6. $g(x) = 5(3x+21)^5-6$

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. $g(x) = 3(x+5)-7$
8. $g(x) = 3(x+5)^2-7$
9. $g(x) = x^2-4x-7$
10. $g(x) = 4x^2+5x+17$

The reason I stress point-slope form: $y = m(x-h)+k$ corresponds to: $y = m(x-x_1)+y_1$.

The "cheat" for completing the square: $g(x) = ax^2+bx+c = a(x-h)^2+k = a\left(x+\dfrac{b}{2a}\right)^2+g\left(-\dfrac{b}{2a}\right)$

Note that $h = -\dfrac{b}{2a}$. A student learning to complete the square might better achieve mastery by checking their work by completing the square with and with*out* the cheat. Make sure results match. Find out why they don't, if they don't. Own it.