Math 16A
Vogler

Functions Review

Defn An equation in x & y is a **function** if each x-value has a unique y-value

Note: The graph of a function passes the vertical line test.

Notation: If y is a function of x, we write $y=f(x)$ or $y(x)$.

Defn Assume $y=f(x)$ is a function.

I) The **domain** of function f is set of all admissible x-values.

II) The **range** of function f is set of all corresponding y-values

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Defn Assume $y=f(x)$ & $y=g(x)$ are functions. The **composition** of functions f & g is $(f\circ g)(x)=f(g(x))$

Defn A function $y=f(x)$ is **one-to-one** (or 1-1) if each y-value has exactly one x-value. More precisely, a one-to-one function has the property that if $f(x_1)=f(x_2)$ (y-values are equal), then $x_1=x_2$ (x-values are equal).

Note: The graph of a 1-1 function passes the horizontal line test.

Useful Formulas

1) $a^2-b^2=(a+b)(a-b)$
2) $a^3-b^3=(a-b)(a^2+ab+b^2)$
3) $a^3+b^3=(a+b)(a^2-ab+b^2)$

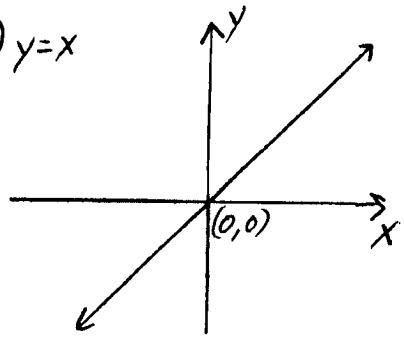
Basic Translation Rules For Graphs

Assume $f(x)$ is a function.

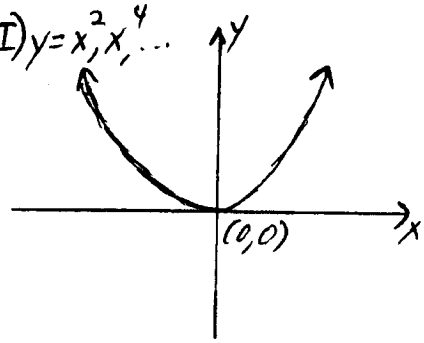
1) $f(-x)$ is $f(x)$ reflected about y-axis.
2) $-f(x)$ is $f(x)$ reflected about x-axis.
3) $f(x-a)$ is $f(x)$ shifted right a units $(a>0)$
4) $f(x+a)$ is $f(x)$ shifted left a units $(a>0)$
5) $f(x)+a$ is $f(x)$ shifted up a units $(a>0)$
6) $f(x)-a$ is $f(x)$ shifted down a units $(a>0)$
7) $a \cdot f(x)$ is $f(x)$ stretched by a factor of a $(a>1)$
8) $\frac{1}{a} \cdot f(x)$ is $f(x)$ contracted by a factor of a $(a>1)$

Base Graphs You Should Know & Love

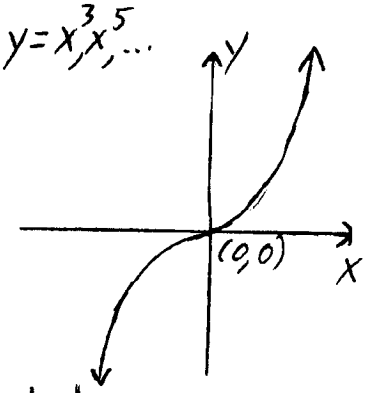
I) $y=x$



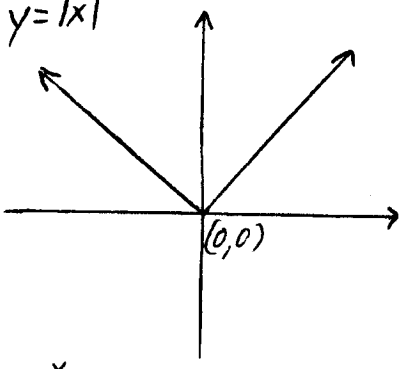
II) $y=x^2, x^4, \ldots$



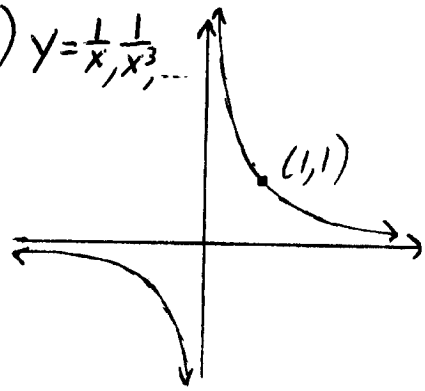
III) $y=x^3, x^5, \ldots$



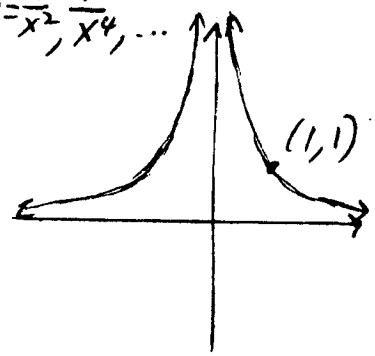
IV) $y=|x|$



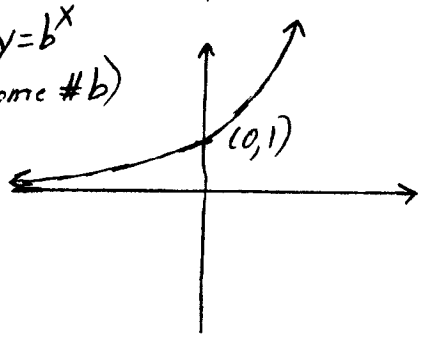
V) $y=\frac{1}{x}, \frac{1}{x^3}, \ldots$



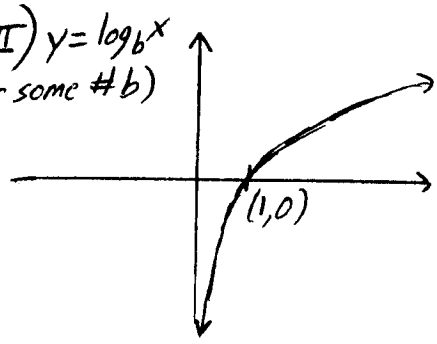
VI) $y=\frac{1}{x^2}, \frac{1}{x^4}, \ldots$



VII) $y=b^x$ (for some #b)



VIII) $y=\log_b x$ (for some #b)



Note: You should also know the graphs of trig. functions, which will be on a future handout.