WORKSHEET 2

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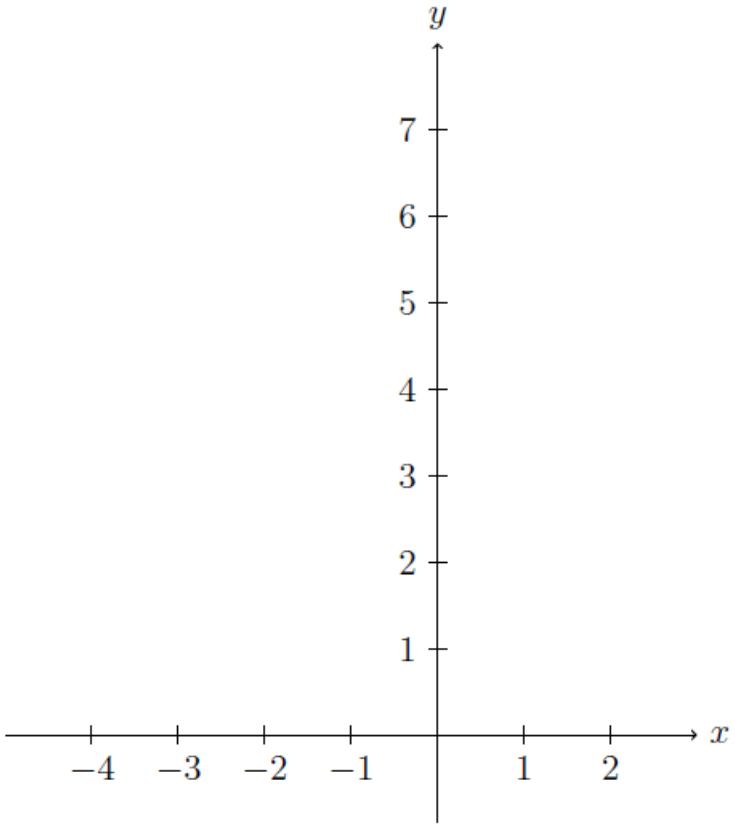
Problem 1. Consider the function $f(x) = x^2 + 6x^2 + 11$.

(a) Complete the square and write the function in the form $(x - a)^2 + b$.

(b) Sketch the graph of $g(x) = x^2$ and the function $f(x)$ from part (a).



(c) Explain what transformations would one perform on the graph of x^2 to obtain the graph of $f(x)$ from question (a).

(d) Consider the function $f(x) = x^2+6x+11$ as above. Let P be the point $(-3, 2)$. Compute the **slope of the secant line** between P and each of $Q(-4, 3)$ and $R(-2, 3)$.

$m_{PQ} =$

$m_{PR} =$

(e) Draw the corresponding secants on the graph on the previous page, and **estimate the slope of the tangent** to the curve at the point P. Draw the tangent to the curve.

(f) Write the equation of the tangent line at the point $x = -3$.

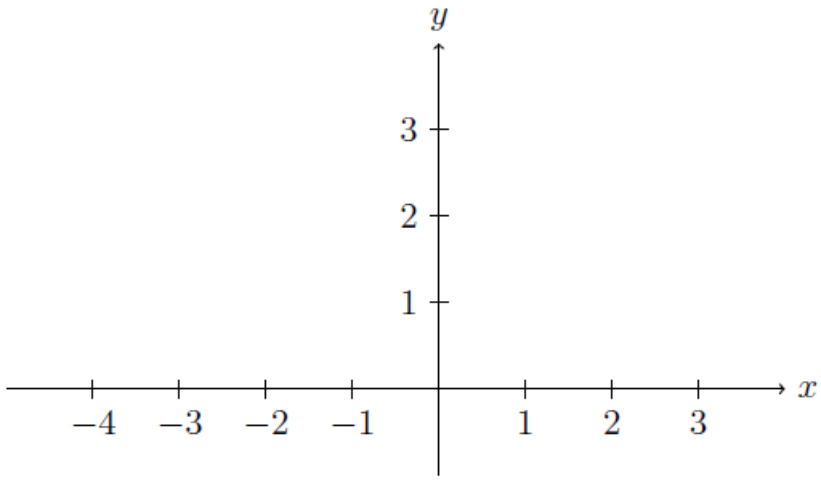
Problem 2. Let $f(x) = \dfrac{1}{x}$. Assuming that $h \neq 0$, find and simplify $\dfrac{f(x+h) - f(x)}{h}$.

Problem 3. Consider the function $g(x) = |x + 1| + 2$.

(a) Write the function as a piecewise function:

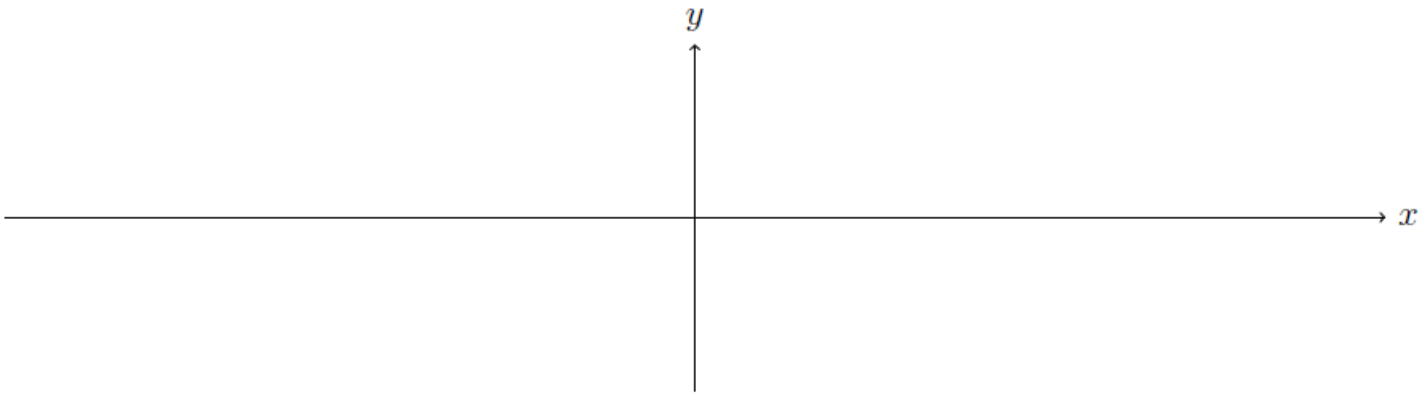
$$g(x) = \begin{cases} & \text{when } x < -1 \\ & \\ & \text{when } x \geq -1 \end{cases}$$

(b) Draw the graph of $g(x)$ on the axes below:



(c) Do you notice any geometric differences between the graphs of $f(x)$ from Problem 1 at the point $(-3, 2)$ and $g(x)$ (Problem 3) at the point $(-1, 2)$?

Problem 4. Plot and label the functions $f(x) = \sin x$ and $g(x) = \cos x$. Label the x-axis with the appropriate multiples of π. What is the domain and range of the sine and cosine functions?



Problem 5. Fill in the following table of values of the given trigonometric functions:

θ	0	π	$\frac{\pi}{2}$	$\frac{\pi}{3}$	$\frac{\pi}{4}$	$\frac{\pi}{6}$
$\cos(\theta)$						
$\sin(\theta)$						
$\tan(\theta)$						
$\sec(\theta)$						
$\csc(\theta)$						
$\cot(\theta)$						

Problem 6. Solve $4^{x-2} = 8$. Be sure your answer is simplified.