

You should work on the following problems in groups of 3. Try to get through as many as you can, but you aren't expected to finish everything. Instead, you should make sure everyone in your group knows **how** to solve all the problems, and not just the answers.

A Review of PreCalc

- Which of the following are functions?
- Sketch a graph of each of the following functions. Be sure to correctly label any x or y intercepts as well as any asymptotes: a) $\sin x$, b) $\cos x$, c) e^x , d) $\ln x$, e) $|x|$, f) $f(x) = \begin{cases} x + 2 & \text{if } x > 1 \\ x^2 & \text{if } x \leq 1 \end{cases}$
- Let $f(x)$ be the function of a line that passes through the points $(-2, 2)$ and $(0, 1)$. Find an algebraic description of f .
- Re-write $\ln(x + 3) + \ln(x - 4) - \ln(x^2 + 1)$ in the form $\ln(\text{something})$
- Simplify: $(\cos x \tan x)^2 - e^{-2x} e^x + \frac{1}{\sec^2 x} + \frac{2^x}{4^x} - \sqrt[3]{x} \ln e^6$
- Solve the following inequalities:
 - $\frac{1}{x-3} > 4$
 - $|y - 3| < 4$
 - $x^2 - 6x + 8 < 0$ (Note: you may want to write down your answer for future reference...)

Even and Odd functions

- Determine whether each of the following functions are (e) even, (o) odd, or (n) neither. You should do this by both (a) graphing the function and (b) using the definitions of even and odd.
 - $f(x) = x$
 - $g(x) = x^2$
 - $p(x) = e^x$
 - $h(t) = \sqrt[3]{t}$
 - $f(x) = \sin x$
 - $q(s) = s + 3$
- For what positive integers n is $f(x) = x^n$ even? odd?
- Show that no matter what function f you start with, $g(x) = \frac{f(x)+f(-x)}{2}$ is even and $h(x) = \frac{f(x)-f(-x)}{2}$ is odd.
 - Prove that **every** function f can be written as the sum of an even function and an odd function.
- (Hard!) List **all** the functions that are both even and odd.

Domain and Range

- Go back to the very first section of this worksheet and determine the domain and range of all the functions in problem (1).
- Find the domain of each of the following functions:
 - $\frac{3}{x-1}$
 - $\frac{1}{e^x}$
 - $\sqrt{x^2 - 6x + 8}$
 - $\sqrt[3]{x^2 - 6x + 8}$
 - $\frac{1}{\ln x}$
 - $\begin{cases} \sqrt{x} & \text{if } x \geq 1 \\ 0 & \text{if } x < 1 \end{cases}$
 - $\tan x$
 - $\frac{\sqrt{x}}{1-x} + \frac{1}{\sqrt[4]{x^2 - 6x + 8}}$