Math 19A — Jan 15, 2000
Calculus for Science, Engineering, and Mathematics
Winter 2000, UCSC

PRACTICE QUIZ 1

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1. Recall that a function f is said to be *odd* if $f(-x) = -f(x)$ and *even* if $f(-x) = f(x)$. Classify the following functions as even, odd, both, or neither: x, x^2, x^3, $\sin x$, $\cos x$, and e^x.

2. Show that any function which is both even and odd must be identically zero, i.e., $f(x) = 0$ for all x.

3. Show that any function which is neither even nor odd may be written as the sum of an odd and an even function neither of which is identically zero (*Hints:* follow these steps

(i) Define $E(x) := \frac{f(x)+f(-x)}{2}$ and $O(x) := \frac{f(x)-f(-x)}{2}$. Show that if f is neither even nor odd, then the functions $E(x)$ and $O(x)$ are not identically zero.

(ii) Show that $E(x) + O(x) = f(x)$.

(iii) Check that $E(x)$ is even and $O(x)$ is odd.).

4. Write e^x as the sum of an odd and an even function and graph all three functions. (*Note:* The odd and even parts of e^x are important functions which are known, respectively, as the hyperbolic sine (sinh) and hyperbolic cosine (cosh).)