# Homework 1 feedback

## 16/20

For future reference, all answers to homework questions are expected to be given with justification, i.e. reasoning to explain the answer.

1. (1/2) No answer or explanation given as to whether or not $f(x) = e^{x^2}\sin(4x)$ is even or odd. It is odd because

$$f(-x) = e^{(-x)^2}\sin(4(-x)) = e^{x^2}\sin(-4x) = -e^{x^2}\sin(4x) = -f(x).$$

2. (1/2) Explanation needed as to why, for example, $f(x) = \sin(x)$ was not invertible in this problem. (It is invertible if the domain is $[0, \pi/2]$ or something; so why isn't it invertible in this situation?)

3. Good!

4. Good!

5. Please be careful about writing down your answers. For (c), It is technically not correct or sensible to write

$$\lim_{x \to 1} \frac{\sin^2(x-1)}{x^2 - 2x + 1} = \left(\frac{\sin(x-1)}{x-1}\right)^2$$

without writing $\lim_{x \to 1}$ again. Similarly, for (d), it is not literally true that
$$\frac{\sin(\sin(x))}{\sin(x)} = 0.886.$$

6. Good!

7. (0/2) Problem not finished.
The function in (a) has a removable discontinuity, because although it is not defined at $x = 1$, we can remove the discontinuity of $\frac{x^3-1}{x-1}$ by factoring out $x - 1$, as you did.
The function in (b) has discontinuities that are not removable, for example at $x = \pi/2$.
The function in (c) also has discontinuities that are not removable, because the expression $\frac{x^4+x^2+5x}{x-3}$ does not have a well-defined limit as $x \to 3$.
The function in (d) has a discontinuity at 0 that is not removable because $\lim_{x\to 0} \frac{\text{sign}(x)}{x}$ does not exist.

8. Good!

9. This problem was meant to be done the same way as Problem 8, and in the same way as the examples in class. On quizzes and exams, graphing calculators are not permitted, so it is important to learn how to do these kinds of problems without them. However, there was a typo in (b) (the expression should've been $e^{2023x} = -x$), so because I made a mistake no points deducted.