Homework 1

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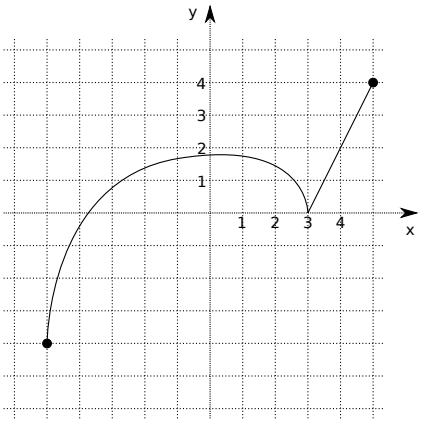
Due May 24

Be first to report a math error for extra credit.

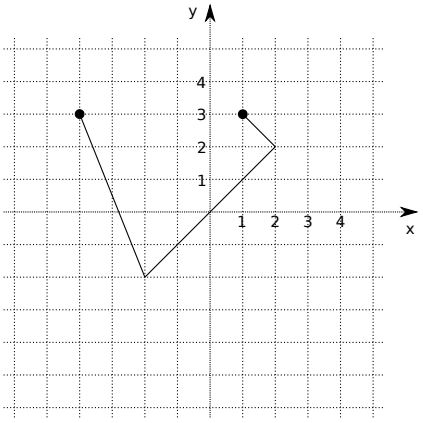
Read Stewart chapter 1. Alternatively, read
`http://en.wikibooks.org/wiki/Calculus/Precalculus`.
Both sources contain ample selections of practice exercises.

In the following 6 exercises, figure out if the given object is a function. If it is, then find its domain and range, sketch it (if given by a formula), determine whether or not the function is one-to-one, and check if it is even, odd, or neither.

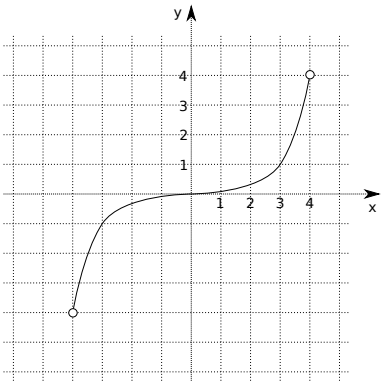
Exercise 1.



Exercise 2.



Exercise 3.



Exercise 4. $f(x) = x^4$.

Exercise 5. $f(x) = \sqrt{x-5}$.

Exercise 6. $f(x) = \begin{cases} \sqrt{x} & \text{if } x \geqslant 0 \\ \sqrt{-x} & \text{if } x \leqslant 0 \end{cases}$

Exercise 7. Find the domain of $f(x) = \frac{2x^3-5}{x^2+x-6}$.

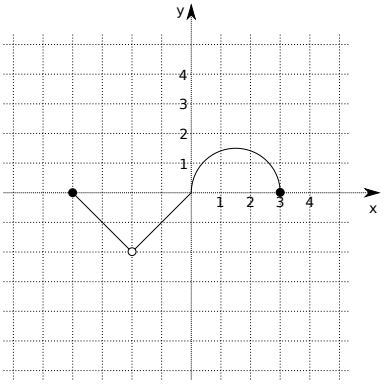
In the following 3 exercises, determine whether a given function is even, odd, or neither.

Exercise 8. $f(x) = \dfrac{x^2}{x^4+1}$.

Exercise 9. $f(x) = \dfrac{x}{x+1}$.

Exercise 10. $f(x) = \dfrac{x}{x^2+1}$.

Exercise 11. The function $f(x)$ is given by a graph. Plot the following functions, each on its own coordinate axes: $f(x-2)$, $f(x)-2$, $2f(x)$, $f(2x)$, $f(-x)$, $-f(x)$.



Exercise 12. Plot the following functions: $f(x) = 2\sin(x-\pi)$, $g(x) = \cos(\pi x) + 1$.

In the following 2 exercises, find $(f+g)(x)$, $(fg)(x)$, $(f \circ g)(x)$, $(g \circ f)(x)$. Simplify the best you can.

Exercise 13. $f(x) = \sqrt{x}$, $g(x) = x\sqrt{x}$.

Exercise 14. $f(x) = x^2 + 1$, $g(x) = e^x$.

Exercise 15. Find $(f \circ g \circ h)(x)$ where $f(x) = \frac{x}{x+1}$, $g(x) = \sin(x)$, $h(x) = |x|$.

In the following 2 exercises, find the functions $f \circ g$, $g \circ f$, $f \circ f$, $g \circ g$, and their respective domains.

Exercise 16. $f(x) = 1 - 3x$, $g(x) = \cos(x)$.

Exercise 17. $f(x) = \sqrt{x}$, $g(x) = \sqrt[3]{1-x}$.

Exercise 18. Find the domain of a function $f(x) = \dfrac{1-e^{x^2}}{1-e^{1-x^2}}$.

In the following 6 exercises, solve the given equations.

Exercise 19. $e^{7-4x} = 6$.

Exercise 20. $e^{2x} - 3e^x + 2 = 0$.

Exercise 21. $e^{ax} = ce^{bx}$, where a, b, c are constants and $a \neq b$.

Exercise 22. $\ln(x^2 - 1) = 3$.

Exercise 23. $\ln(x) + \ln(x-1) = 1$.

Exercise 24. $\ln(\ln x) = 1$.

Exercise 25. Sketch the given curve: $x = t^2 + t$, $y = t^2 - t$, $t \in [-2, 2]$.

Exercise 26. Eliminate the parameter to find the Cartesian equation of the curve: $x = \sqrt{t}$, $y = 1 - t$.