

Scoring guidelines for written response problems

- 5:** a correct solution that is presented well or shows exceptional understanding
- 4:** a solution that is correct, complete, and adequately presented
- 3:** a mostly satisfactory solution with a few missing details or minor errors
- 2:** a partial solution with at least one major step or idea missing
- 1:** a minimal start toward a correct solution
- 0:** no progress toward a correct solution

Part A. Equations, graphs, and tables

1. All can be found by graphing $f(x)$ then using features on the calculator's CALC menu.

zeros: $x \approx -2.95$ (note that the y-intercept, $y = 8$, is not a zero of the function)

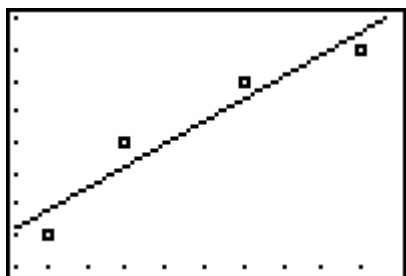
maximum: $\approx (-1.41, 13.66)$

minimum: $\approx (1.41, 2.34)$

2. Algebraic approaches on this problem are fairly hard; you'd end up needing to solve a 4th degree polynomial. Graphical approaches tend to work better here.

For example, rewrite the equation as $(x - 3)^2 - \sqrt{x - 1} = 0$, then use the calculator's zero finder to get that the solutions are $x = 2$ and $x \approx 4.35$.

3. $y \approx 0.72x + 2.07$

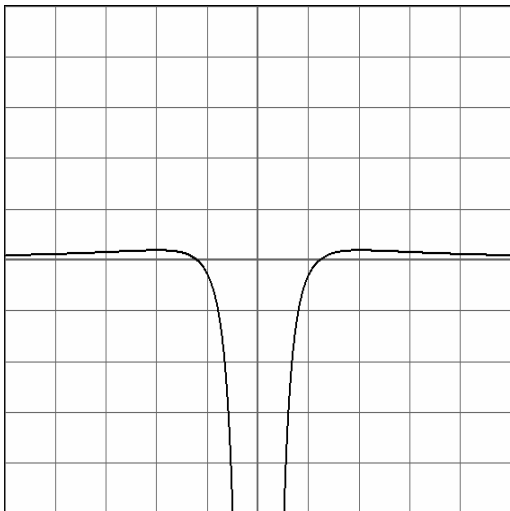


Part B. Properties of functions

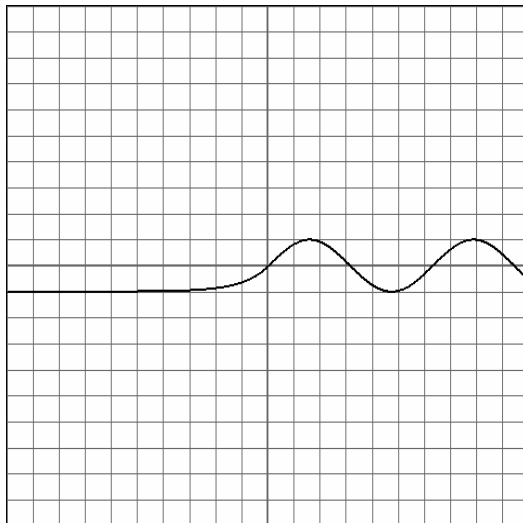
- 1.

function	domain	range
$f(x) = \sqrt{x - 20}$	$x \geq 20$	non-negative numbers
$g(x) = \ln(x + 1)$	$x > -1$	all real numbers
$h(x) = 2 \cdot \text{int}(x)$	all real numbers	all even integers

2. One possible answer:



3a.

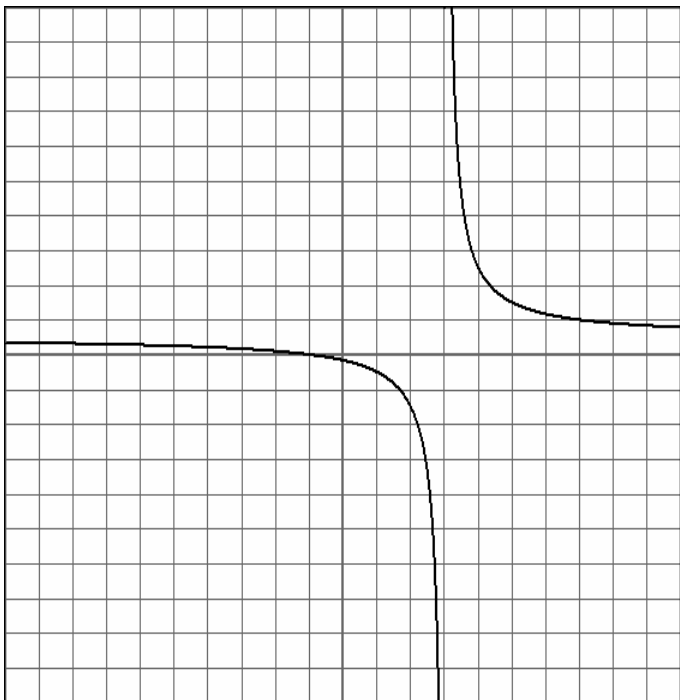


3b. Yes, $p(x)$ is continuous. Each of the two pieces is continuous, and the pieces join together in an unbroken way at $(0, 0)$.

3c. Yes, for example, $p(x)$ has an upper bound of 1 because $p(x) \leq 1$ for all x .

4. True statements: **a, c, e, g.**

5. Horizontal asymptote $y = \frac{1}{2}$, vertical asymptote $x = 3$.



Technology note: The graphs on this page were made using a Windows program called GraphCalc, which you can download for free from www.graphcalc.com. You might want to use GraphCalc instead of your TI-83 for some types of homework in this class.