

Math 102 Quiz 1

Brittany Noble

You must work all of your problems on the quiz. Show ALL of your work and **BOX IN YOUR FINAL ANSWERS**. A correct answer with no relevant work may receive no credit, while an incorrect answer accompanied by some correct work may receive partial credit. Textbooks, class notes, crib sheets, or calculators are not permitted.

1. (10 points) Find the domain of $p(x) = \sqrt{\frac{2}{x-1}}$. Write your solution in interval notation.

Since $x - 1 > 0$, we have that $x > 1$. If we draw this interval on the real line, we can see that the appropriate interval notation for this solution is $(1, \infty)$

2. (10 points) Find $\frac{f(x+h)-f(x)}{h}$ for $h \neq 0$ if $f(x) = \frac{1}{x}$. Simplify completely. *Hint: the solution is not 1.*

Since $f(x+h) = \frac{1}{x+h}$ and $f(x) = \frac{1}{x}$, we can substitute these into the above expression:

$$\frac{f(x+h)-f(x)}{h} = \frac{\frac{1}{x+h} - \frac{1}{x}}{h}$$

Finding a common denominator of $x(x+h)$ and simplifying, we obtain:

$$\frac{\frac{1}{x+h} - \frac{1}{x}}{h} = \frac{\frac{x}{x(x+h)} - \frac{x+h}{x(x+h)}}{h} = \frac{\frac{x-(x+h)}{x(x+h)}}{h} = \frac{\frac{x-x-h}{x(x+h)}}{h} = \frac{\frac{-h}{x(x+h)}}{h} = \frac{-h}{x(x+h)} \cdot \frac{1}{h} = \frac{-1}{x(x+h)}$$

3. (10 points) Find the average rate of change of $q(x) = -2x^2 + 4$ on the interval from 0 to 2.

We calculate the slope of the secant line to find the average rate of change:

$$\frac{f(2)-f(0)}{2-0} = \frac{-2(2)^2+4-(-2(0)^2+4)}{2} = \frac{-8}{2} = -4$$

4. Consider the function $g(x) = \sqrt[3]{x}$ for the following questions:

a. (1 point) In interval notation, the domain of $g(x)$ is: $(-\infty, \infty)$

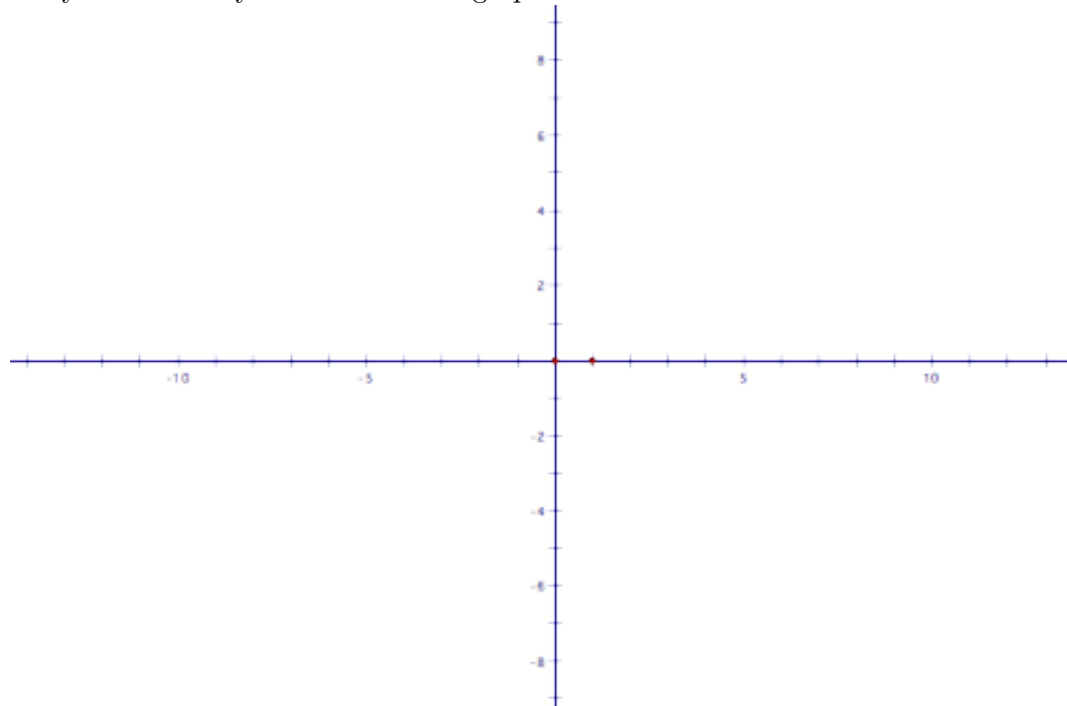
b. (1 point) The intercept(s), if any, are: $(0, 0)$

c. (2 points) What kind of symmetry does the graph of $g(x)$ have, if any? Why?

Symmetry with respect to the origin because $g(-x) = -g(x)$ and g is odd.

d. (3 points) Sketch the graph on the following grid. Include at least three (3) points on your graph. Neatness counts.

See your book or your notes for the graph.



e. (1 point) Use your graph to find the range of $g(x)$. $(-\infty, \infty)$

f. (1 point) On what interval(s) is $g(x)$ increasing? $(-\infty, \infty)$

g. (1 point) Does $g(x)$ have any local extrema (i.e., any local maxima or local minima)? If so, what are they? No local extrema.

