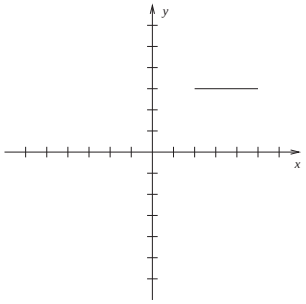
MATH 103 Pre-Calculus Mathematics
Quiz #3 Fall 2008
Sample Solutions

Consider the following graph (which is that of the line segment connecting $(2, 3)$ and $(5, 3)$):



1. Augment the given graph as little as possible to make it have x-axis symmetry. Also indicate whether the completed graph corresponds to a function.

Solution: To make the graph symmetric with respect to the x-axis, it suffices to add the line segment connecting the points $(2, -3)$ and $(5, -3)$. The resulting graph fails the vertical line test —any vertical line $x = c$, with $2 \leq c \leq 5$, intersects the graph at two points— and hence does not correspond to a function.

2. Augment the given graph as little as possible to make it have y-axis symmetry. Also indicate whether the completed graph corresponds to a function.

Solution: To make the graph symmetric with respect to the y-axis, it suffices to add the line segment connecting the points $(-2, 3)$ and $(-5, 3)$. The resulting graph passes the vertical line test and hence corresponds to a function.

3. Augment the given graph as little as possible to make it have origin symmetry. Also indicate whether the completed graph corresponds to a function.

Solution: To make the graph symmetric with respect to the origin, it suffices to add the line segment connecting the points $(-2, -3)$ and $(-5, -3)$. The resulting graph passes the vertical line test and hence corresponds to a function.

4. Determine the domain of the function

$$f(x) = \frac{\sqrt{x+1}}{x\sqrt{2-x}}$$

Solution: The subexpression $\sqrt{x+1}$ is undefined when $x < -1$. The subexpression $\sqrt{2-x}$ is undefined when $x > 2$. The denominator has value zero (making the function undefined) when either $x = 0$ or $x = 2$. All remaining values are in the function's domain. This set of values can be expressed as $[-1, 0) \cup (0, 2)$