# (2)

# Notes on ICNS 100

## Chapter 2: 2.6 Symmetry

1. A graph is symmetric about the $y-$axis if and only if $(-a, b)$ lies on the graph when $(a, b)$ does.

2. In practice, to test the symmetry about the $y-$axis, replace $x$ by $-x$ in the given equation and see if an equivalent equation is obtained. For example, the graph of $y = x^2$ is symmetric about the $y-$axis.

3. A graph is symmetric about the $x-$axis if and only if $(a, -b)$ lies on the graph when $(a, b)$ does.

4. In practice, to test the symmetry about the $x-$axis, replace $y$ by $-y$ in the given equation and see if an equivalent equation is obtained. For example, the graph of $x = y^2$ is symmetric about the $x-$axis.

5. We note that the constant function $f(x) = 0$, for all $x$, is symmetric about the $x-$axis. It turns out that this is the only "function" whose graph is symmetric about the $x-$axis.

6. A graph is symmetric about the origin if and only if $(-a, -b)$ lies on the graph when $(a, b)$ does.

7. In practice, to test the symmetry about the origin, replace $x$ by $-x$ and $y$ by $-y$ in the given equation and see if an equivalent equation is obtained. For example, the graph of $y = x^3$ is symmetric about the origin.

   Example

   Graph the following equations using intercepts and symmetry:
   (a) $y = 1/x$ (b) $y = 1 - x^4$ (c) $4x^2 + 9y^2 = 36$

8. A graph is symmetric about the line $y = x$ if and only if $(b, a)$ lies on the graph when $(a, b)$ does.

9. In practice, to test the symmetry about the line $y = x$, we interchange the roles of $x$ and $y$ in the given equation and see if an equivalent equation is obtained. For example, the graph of $x^2+y^2 = 1$ is symmetric about the line $y = x$.

   Example

   Sketch the graph of $g(x) = 2x+1$ and its inverse in the same plane.

Assignment Do Problems 2.6: 8, 16, 20, 24, 27.