Last name _____

First name _____

LARSON—MATH 591—CLASSROOM WORKSHEET 24
Monomial Ideals

Let $I = \langle x^2y^5, x^3y^4, x^4y^2 \rangle \subseteq \mathbb{R}[x, y]$.

1. Draw a representation of the monomials contained in this ideal.

2. Find the set of monomials x^α such that $x^\alpha y^k$ is contained in I for some $k \geq 0$.

3. Let J be the ideal generated by these monomials. J is an ideal in $\mathbb{R}[x]$ and thus has a single generator. Find the generator of J.

4. Let $m = \min\{k : x^2y^k \in J\}$. Find m.

5. Let J_0 be ideal in $\mathbb{R}[x]$ generated by the set of monomials of the form x^β where $x^\beta y^0 \in I$. Find the generator of J_0.

6. Let J_1 be ideal in $\mathbb{R}[x]$ generated by the set of monomials of the form x^β where $x^\beta y^1 \in I$. Find the generator of J_1.

7. Let J_2 be ideal in $\mathbb{R}[x]$ generated by the set of monomials of the form x^β where $x^\beta y^2 \in I$. Find the generator of J_2.

8. Let J_3 be ideal in $\mathbb{R}[x]$ generated by the set of monomials of the form x^β where $x^\beta y^3 \in I$. Find the generator of J_3.

9. Let J_4 be ideal in $\mathbb{R}[x]$ generated by the set of monomials of the form x^β where $x^\beta y^4 \in I$. Find the generator of J_4.