



6. Consider the integers  $\mathbb{Z}$  (an integral domain, right?). What does the notation  $\langle 3 \rangle$  mean? What sort of thing is this? What is  $\langle r \rangle$  in general?
7. What is  $\mathbb{Q}[x]$ ? Then give an example of an ideal in  $\mathbb{Q}[x]$ , using proper notation and by listing out some of the elements in the ideal.
8. Give the definition of a **quotient ring** (i.e. a **factor ring**). What do elements of a quotient ring look like? How are the operations defined?
9. Illustrate what you wrote about quotient rings above using two examples: First,  $\mathbb{Z}/\langle 3 \rangle$ , and then  $\mathbb{Q}[x]/\langle x^2 + 1 \rangle$ . How many elements are in each of these quotient rings? What do the elements look like? Show how to add/multiply elements.