MA125 Assignment 2

## Name:

1) Use the principle of mathematical induction (Page 87) to prove that  $1+3+5+\dots+(2n-1)\ =\ n^2$ 

2) Suppose a function f is defined by

$$f(x) = |x - 1| + |2x - 6|$$

a) Write f as a piecewise defined function that does not involve absolute values.

b) Find the solution(s) of the equation

f(x) = 3

if there are any.

c) Copy the MAPLE worksheet provided on the web page for this problem and modify it for this problem. Then use it to verify your answer.

3) Suppose a sequence of functions  $f_n$  is defined recursively by:

$$f_0(x) = x^2$$

and

$$f_{n+1}(x) = f_0(f_n(x))$$
 for  $n = 0, 1, 2, ...$ 

Find a formula for  $f_n(x)$ .

4) Find parametric equations for the path of a particle that moves counterclockwise halfway around the circle whose equation is

$$(x-2)^2 + y^2 = 4$$

from the top of the circle to the bottom. (You may use the MAPLE worksheet provided and modify it for this problem).

5) The half-life of palladium-100,  $^{100}Pd$ , is four days. The initial mass of a sample is one gram.

- a) Find the mass that remains after 16 days.
- b) Find the mass m(t) that remains after t days.
- c) Find the inverse of m(t) and explain its meaning.
- d) When will the mass be reduced to 0.01g?