Project

For your mathematics project you are required to produce two working Java programs that adhere to the programming standards that you have been taught in *Introduction to Programming*. You will have one lab session in your *Introduction to Programming* module that will be designed to help you to solve these problems.

This is an individual project, and such the projects that you submit should be all your own work. Programs should be commented where possible, and any borrowed code should be acknowledged suitably.

1. Given the functions

   $f, g: \mathbb{Z} \to \mathbb{Z}$ where
   $f(x) = 3x + 2$ and
   $g(x) = 8x^3$.

   Calculate the inverse of $f(x)$ and the inverse of $g(x)$.

   Write a program that will allow a user to enter a value for x and returns an output value for each of the compositions:

   i. $f \circ f$
   ii. $g \circ g$
   iii. $f \circ g$
   iv. $g \circ f$
   v. $f^{-1} \circ f$
   vi. $g^{-1} \circ g$

2. Given the predicates

   $P(x): x \; is \; odd$ and
   $Q(y): y > 5$

   Write a Java program that will allow a user to enter values for x and y and return output values for the following:

   i. the conjunction of $P(x)$ and $Q(y)$
   ii. the disjunction of $P(x)$ and $Q(y)$
   iii. the negation of $Q(y)$.

Note: You should spend some time working this out on paper before you start to code your solutions in Java.