## CM 1606 Computational Mathematics

## Tutorial No 03

1) State whether the given assignments (Relations) below are functions or not. If it is not a function, clearly state the reason.

| No | Relation (Assignment) | Yes/No | If No, reason? |
|---|---|---|---|
| 1 | f = {(p,m),(q,n),(r,n)};Domain={p,q,r} | | |
| 2 | g = {(p,x),(q,y),(r,z)} ; domain={p,q,r} | | |
| 3 | h = {(0,5),(1,5),(2,5),(3,5); Domain={0,1,2,3,4} | | |
| 4 | i = {(-3,-1),(-3,0),(-3,1),(-3,2)}; Domain={-3} | | |
| 5 | j = {(-2,3),(-2,4),(-1,5),(0,6)};Domain={-2,-1,0} | | |
| 6 | k = {(a,x),(b,y),(c,y),(d,z)};Domain={a,b,c,d} | | |
| 7 | l = {(1,2),(1,4),(3,2),(3,4)}; where Domain = {1,2,3} and codomain = {2,4,6} | | |
| 8 | m = {(-3,0),(-3,1),(10,-2),(10,-1)} ; where domain = {4,-3,10} and codomain = {0,-2,-1,1,2} | | |

2) For the function $f(x) = -3(x-2)^2 + 5$, find the image 'b' of each element 'a' in the domain.

$i) f(0)$      $ii) f(1)$      $iii) f(-2)$      $iv) f(2)$

3) If $f(x) = 2(4-x)^2 - 3$ and $g(x) = (x+3)^2 - 3$, simplify the following.

$i) f(x) + g(x)$
$ii) f(x) - g(x)$
$iii)$ find the values for $a$ and $b$ such that $f(x) - g(x) = (x-a)^2 + b$
$iv) f(x) + 2g(x)$
$v) (f + 2g)(0)$

4) If $f(x) = -2x^2$ and $g(x) = x+1$, find the composed rules and values for following.

$i) f(g(x))$

$ii) g(f(x))$

$iii) f(g(-1))$

$iv) f(g(0))$

$v) g(f(0))$

$vi) g(f(-2))$

5) Find the rule of the inverse for the functions given below.

$i) f(x) = -2x+1$

$ii) f(x) = \dfrac{1}{3}x - 5$

$iii) f(x) = \sqrt{x-2}$

$iv) f(x) = \dfrac{-1}{4}\sqrt{2x+3}$

$v) f(x) = 3e^x + 4$

6) Find the minimum/maximum value of the quadratic functions given using the method of completing squares and complete the following table.

| No | Function | Min/Max | Min/Max value | When this occurs (x) |
|----|----------|---------|---------------|----------------------|
| 1 | $f(x) = x^2 + 5x - 2$ | | | |
| 2 | $f(x) = x^2 - 6x - 12$ | | | |
| 3 | $f(x) = -x^2 + 4x + 6$ | | | |
| 4 | $f(x) = -x^2 - 6x + 8$ | | | |
| 5 | $f(x) = -2x^2 + 4x + 9$ | | | |
| 6 | $f(x) = x^2 - x - 1$ | | | |
| 7 | $f(x) = x^2 - 8x + 5$ | | | |
| 8 | $f(x) = 2x^2 + 8x - 1$ | | | |