TOI-OHOMAI Institute of Technology	**COMP.5202 Fundamentals of Programming and Problem Solving**	**Mathematics Algebra**

Algebra Review Questions – Sample Answers

A. Simplify the following:

1. $x^2 + 7x + 2x^2 – 4x$

   $3x^2 + 3x$

2. $3bx^2 -8 + 5ay + 9bx^2 – 2ay + 6$

   $12bx^2 + 3ay - 2$

3. $a^3b^2 + a^2 – 4b^2 + 5a^3b^2 + 5b^2$

   $6a^3b^2 + a^2 + b^2$

4. $6t^2 + 7 + 3a^2z – 2t^2 – 1 - 5a^2z$

   $4t^2 – 2a^2z + 6$

5. $2py + 4y^2 -4 + 2p – 2y^2 – 3 - 5py$

   $-3py + 2y^2 + 2p – 7$ or **$2y^2 – 3py + 2p - 7$**

B. Simplify the following by removing the brackets:

1. $3yp^2(5y^2p^4)$

   $15y^3p^6$

2. $-2pc(3c - 8p)$

   $-6pc^2 + 16p^2c$ **or** **$16p^2c - 6pc^2$**

3. $(-3y + 2)(3 - 2y)$

   Firsts: $-9y$ Lasts: $- 4y$ Inners: 6 Outers: $6y^2$

   $6y^2 – 13y + 6$

4. $(3ax + 4)(3 – 4x)$

   Firsts: $9ax$ Lasts: $-16x$ Inners: 12 Outers: $-12ax^2$

   $-12ax^2 – 7ax + 12$

5. $y(4 - y) + 3(4 + 2y) + (y - 1)^2$

   $(4y –y^2) + (12 + 6y)$ + $(y -1)(y – 1)$

   $10y – y^2 + 12$ + $y^2 + 1 –y -y$

   $8y + 13$

C. Simplify the following:

1. $\frac{-9c^6}{6c^3}$

$\frac{-3}{2}c^3$

2. $\frac{20x^3y^6}{-5x^5y^2}$

$\frac{-4y^4}{x^2}$

3. $\frac{9p^4 - 6p^2}{3p}$

$3p^3 - 2p$

4. $\frac{10x^2 - 4x^3}{-2x}$

$-5x + 2x^2$ **or** **$2x^2 - 5x$**

5. $\frac{12c^3y^2 - 20c^4y - 8c^5y^3}{-4c^2y}$

$-3cy + 5c^2 + 2c^3y^2$ **or** **$2c^3y^2 + 5c^2 - 3cy$**

D. Factorise the following by finding the common factors:

1. $-10bx^2 - 5ax$

   $-5x(2bx + a)$

2. $3p + 12p^2 - 6pq$

   $3p(1 + 4p - 2q)$

3. $16xy - 32x + 8axy$

   $8x(2y - 4 + ay)$ **or** **$8x(2y + ay - 4)$**

4. $-2xy + 14y^2$

   $-2y(x - 7y)$ **or** **$2y(7y - x)$**

5. $3y^3 - 9b^3$

   $3(y^3 - 3b^3)$

6. $3y^3z - 9ay^2 + 12by^3 + 6cy^2$

   $3y^2(yz - 3a + 4b + 2c)$

E. Factorise the following by grouping:

1. $4px + 2ax + 6p + 3a$

   $(2x + 3)(2p + a)$

2. $6x^2 – 4x + 9x – 6$

   $(2x + 3)(3x – 2)$

3. $12xy + 9y – 8x - 6$

   $(3y - 2)(4x + 3)$

4. $3ax + 4bx – 6ay - 8by$

   $(x – 2y)(3a + 4b)$

5. $6ap^2 – 9p – 4a^2p + 6a$

   $(3p – 2a)(2ap - 3)$

F. Solve the following Linear Equations to find the value of x:

1. $2x - 13 = 17$

   x = 15

2. $3 - \frac{2x}{5} = -5$

   x = 20

3. $\frac{5x}{2} - 6 = 4$

   x = 4

4. $4 + 2x = -2x$

   x = -1

5. $3x - 10 = -2x + 5$

   x = 3

6. $30 = 7x + 3x$

   x = 3

G. Factorise the following Quadratic equations:

1. $x^2 + 4x - 21$

   (x + 7) (x – 3)

2. $x^2 - 3x - 54$

   (x - 9) (x + 6)

3. $x^2 - 36$

   (x - 6) (x + 6)

4. $x^2 – 17x$

   x(x – 17)

5. $x^2 + 22x + 72$

   (x + 4) (x + 18)

6. x2 - 22x + 121

   (x - 11) (x - 11) **$(x – 11)^2$**

H. Solve the following quadratic equations to find the values of x (ie. find the "roots"):

1. x^2 -6x - 27 = 0

   (x - 9) (x + 3) = 0

   x = 9
   x = -3

2. x^2 – 2x = 24

   (x - 6) (x + 4) = 0

   x = 6
   x = -4

3. x^2 = 144

   (x - 12) (x + 12) = 0

   x = 12
   x = -12

4. x^2 = 22x

   x(x – 22) = 0

   x = 0
   x = 22

5. x^2 + 49 = -14x

   (x + 7) (x + 7) = 0 **or** **$(x + 7)^2 = 0$**

   x = -7
   x = -7