

Week # 1

NFM2106/NFE2105

1. Combine each expression into a single fraction, simplifying the final result as much as possible:

$$(a) \frac{7}{2n - m} - \frac{6}{2n + m} - \frac{12m}{4n^2 - m^2};$$

$$(b) \frac{a + 2b}{a + b} - \frac{(3a + 2b)b}{(a + b)^2};$$

$$(c) \frac{1}{a} + \frac{1}{a + b} + \frac{2a - b}{a^2 + ab};$$

$$(d) \frac{1}{x - y} + \frac{x + 2y}{x^2 - xy} + \frac{x - y}{x^2};$$

$$(e) \frac{p}{p^2 - 4} + \frac{2}{2 - p} + \frac{1}{p + 2}.$$

2. Given $v = \frac{4}{x^3 - y^2}$, find y in terms of v and x .

3. Re-arrange the following formula to make s the subject

$$m = p\sqrt{\frac{s + t^2}{s - t^2}}.$$

4. Given $u = \frac{x^3 + t}{x^3 - t}$, find t in terms of u and x .

5. In the questions below you are asked to solve for the variable that appears in the equation (i.e., t , p , or x):

$$(a) \frac{1}{1 - t} - \frac{1}{1 + t} = 1;$$

$$(b) \frac{2p + 1}{p + 5} + \frac{p - 1}{p + 1} = 2;$$

$$(c) \frac{1}{x + 1} - \frac{1}{x} = \frac{1}{x - 1} - \frac{1}{x - 2}.$$

6. By completing the square (or using the formula from the notes), determine the coordinates of the vertex for each of the following quadratics:

$$(a) y = x^2 + x + 1;$$

$$(c) y = 4 + 3x - x^2;$$

$$(b) y = 3x^2 - 2x - 1;$$

$$(d) y = 6x - 9 - x^2.$$

7. In each question below you are expected to simplify the result as much as possible:

(a) If $f(x) = x^2 + 3x + 4$, find $f(3x - 2)$;

(b) If $f(x) = 3x^2 - 4x + 7$, find $f(2x + 1)$;

(c) if $f(x) = \frac{2x - 3}{x + 4}$, find $f\left(\frac{x - 1}{x + 1}\right)$.

ANSWERS:

1. (a) $\frac{1}{2n - m}$; (b) $\frac{a^2}{(a + b)^2}$; (c) $\frac{4}{a + b}$; (d) $\frac{3x^2 + y^2}{x^2(x - y)}$; (e) $\frac{6}{4 - p^2}$.

2. $y = \pm \sqrt{\frac{x^3v - 4}{v}}$.

3. $s = \frac{t^2(m^2 + p^2)}{m^2 - p^2}$.

4. $t = x^3 \left(\frac{u - 1}{u + 1} \right)$.

5. (a) $t_{1,2} = -1 \pm \sqrt{2}$; (b) $p_1 = -2, p_2 = 7$; (c) $x = 1/2$.

6. (a) $(-1/2, 3/4)$; (b) $(1/3, -4/3)$; (c) $(3/2, 25/4)$; $(3, 0)$.

7. (a) $9x^2 - 3x + 2$; (b) $12x^2 + 4x + 6$; (c) $-\frac{x + 5}{5x + 3}$.