MA109 FastTrack **Name:** ________________________

Summer 2016 **Tuesday Worksheet**

Instructor: K. Paullin **SOLUTIONS**

Follow all directions. This assignment is to be completed in pencil and with all work shown in the space provided. Unless otherwise specified, give exact answers. Box your final answer. Work that is unreadable will be counted as incorrect.

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1. Factor each expression.

(a) $-6g^5 + 12g^4 - 9g^3$

$$-6g^5 + 12g^4 - 9g^3 = -3g^3(2g^2 - 4g + 3)$$

(b) $2a(a+2) + 3(a+2)$

$$2a(a+2) + 3(a+2) = (a+2)(2a+3)$$

(c) $4k^3 + 6k^2 - 2k - 3$

$$\begin{aligned} 4k^3 + 6k^2 - 2k - 3 &= (4k^3 + 6k^2) + (-2k - 3) = 2k^2(2k+3) - 1(2k+3) \\ &= (2k^2 - 1)(2k+3) \end{aligned}$$

(d) $x^2 + 12 + 13x$

$$\begin{aligned} x^2 + 12 + 13x &= x^2 + 13x + 12 \\ &= x^2 + 12x + 1x + 12 = (x^2 + 12x) + (1x + 12) \\ &= x(x+12) + 1(x+12) = (x+1)(x+12) \end{aligned}$$

(e) $10u^2 - 19u - 15$

$$\begin{aligned} 10u^2 - 19u - 15 &= 10u^2 - 25u + 6u - 15 \\ &= (10u^2 - 25u) + (6u - 15) \\ &= 5u(2u-5) + 3(2u-5) = (5u+3)(2u-5) \end{aligned}$$

(f) $v^4 - 1$

$$\begin{aligned} v^4 - 1 &= (v^2)^2 - (1)^2 \text{Difference of Squares} \\ &= (v^2+1)(v^2-1) = (v^2+1)([v]^2 - [1]^2)\text{Difference of Squares} \\ &= (v^2+1)(v+1)(v-1) \end{aligned}$$

(g) $4m^2 - 20m + 25$

$$\begin{aligned} 4m^2 - 20m + 25 &= (2m)^2 - 2(2m)(5) + (5)^2 \text{Perfect Squares Trinomial} \\ &= (2m-5)^2 \end{aligned}$$

2. **Volume of a Box**
The volume of a rectangular box x inches in height is given by the relationship $V = x^3 + 8x^2 + 15x$. Factor the right hand side to determine:
   (a) the dimensions of the box.

$$\begin{aligned} V &= x^3 + 8x^2 + 15x \\ &= x(x^2 + 8x + 15) \\ &= x(x^2 + 3x + 5x + 15) = x([x^2 + 3x] + [5x + 15]) \\ &= x(x[x+3] + 5[x+3]) \\ &= x(x+3)(x+5) \end{aligned}$$

   (b) Find the volume of the box given that the height is 2ft.
   Careful!! x is measured in inches!

$$\begin{aligned} V &= x(x+3)(x+5) \\ &= 24(24+3)(24+5) = 24 \cdot 27 \cdot 29 \\ &= 18,792 in^3 \end{aligned}$$

3. **Challenge Question!** Factor out a constant that leaves integer coefficients for each term:

$$\frac{1}{2}x^4 + \frac{1}{8}x^3 - \frac{3}{4}x^2 + 4$$

<u>Hint:</u> Find a common denominator for all of the fractions!

$$\begin{aligned} \frac{1}{2}x^4 + \frac{1}{8}x^3 - \frac{3}{4}x^2 + 4 &= \frac{4}{8}x^4 + \frac{1}{8}x^3 - \frac{6}{8}x^2 + \frac{32}{8} \\ &= \frac{1}{8}(4x^4 + x^3 - 6x^2 + 32) \end{aligned}$$