

MPS21 – Precalculus  
Exam 1 Review Sheet

Topics:

- Special Types of Factoring [ Sum & Difference of Cubes, Repeated Factors, Factoring by Grouping, etc. ]
- Polynomial Long Division
- Synthetic Division
- The Remainder Theorem and The Factor Theorem
- The Rational Root Theorem

Practice Problems:

Factor Completely:

1.  $27x^3 + 8$

5.  $3x^3 - 9x^2 - 12x + 36$

2.  $(x - 3)^2 - 9$

6.  $8x^4 - 2x^2 - 15$

3.  $8z^3 - 125$

7.  $x^4 + 2x^3 - x - 2$

4.  $2x^4 - 26x^2 + 72$

8.  $3(5x + 2)^2(1 - x)^2 + (5x + 2)(1 - x)^3$

Divide using long division:

9. 
$$\frac{6x^3 - 19x^2 + 16x - 4}{x - 2}$$

10. 
$$\frac{8x + 5}{2x - 1}$$

Divide using synthetic division:

11.  $(x^3 - 1) \div (x - 1)$

12.  $(x^3 + 6x^2 - 12) \div (x + 5)$

13. Given the polynomial equation  $2x^4 - x^3 - 14x^2 - 5x + 6 = 0$ .

- (a) List all *possible* rational roots.      (b) Use synthetic division to show that  $-1$  is a root and then find all remaining roots.

- (c) If  $f(x) = 2x^4 - x^3 - 14x^2 - 5x + 6$ , use synthetic division and the Remainder Theorem to find  $f(1)$  and  $f(-3)$ .

Multiply and express in simplest form.

14.  $[(x + 3) + y][(x + 3) - y]$

15.  $(x + \sqrt{3})(x - \sqrt{3})$

16.  $10x^3(x - 1)^3$

17.  $(5 + \sqrt{2})(5 - \sqrt{2})$