Math 118 Calculus Ia **Skills 3**

Algebra skills to practice. Get really good at the quadratic formula! Be a ninja of polynomial long division!

Due at the beginning of class Friday, September 30. Write your solutions on separate paper (no ragged edges, please) with multiple pages stapled. Have it ready to turn in at the beginning of class.

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1. Find the exact coordinates of the x-intercepts of the graph.

a. $y = 2x^2 - x - 5$

b. $y = x^2 - 6x + 4$

c. $y = 6x - 1 - 2x^2$

2. Use polynomial long division to help factor the polynomial.

a. $x^3 - 8$ (given that $x = 2$ is a zero of the polynomial.)

b. $x^4 - 3x^3 + x^4$ (given that $x = 3$ is zero.)

c. $x^4 - 4x^2 + 7x + 14$ (given that at least one of $x = -2$, $x = 2$, and/or $x = 7$ is a zero.)

3. Use technology to graph each polynomial, then describe the *sign behavior* near the given zero. Good descriptions would be: "Positive on both sides", "Negative on both sides", "Changes from negative to positive", or "Changes from positive to negative".

a. $16x^4 - 8x^2 + 1$ near the zero at $x = 1/2$

b. $x^4 - 8x + 7$ near the zero at $x = 1$.

c. $4x^3 - 23x^2 + 44x - 28$ near the zero at $x = 2$.

4. Use the factored form of the polynomial to determine the sign behavior near the given zero, *without graphing*. Use the same kinds of descriptions as in the previous problem.

a. $(x - 5)^3$ near the zero at $x = 5$.

b. $-(x + 1)^2$ near $x = -1$

c. $(x - 1)(x - 2)^4$ near $x = 2$

d. $(x - 1)(x - 2)(x - 3)$ near $x = 3$

e. $(x - 2)^2(x - 3)$ near $x = 2$