First Name:_____   Last Name: _____   Student ID: _____

Polynomial Equations and Inequalities (2)

1. Factor fully.

a. x^3-x^2+x-1	e. $5x^3+3x^2-12x+4$
b. $2x^3+11x^2+12x-9$	*f.* $x^3+9x^2+8x-60$
c. x^3-7x-6	*g.* x^4-5x^2+4
d. $3x^3-3x^2+6x-24$	*h.* $x^4+3x^3-38x^2+24x+64$

2. Determine the values of *m* and *n* if $3x^2-x-2$ is a factor of the polynomial $3x^4+mx^3-19x^2+nx+12$. Express the polynomial in factored form.

3. If $x-2$ and $x+2$ are factors of $6x^3+ax^2+bx+16$, determine the values of a and b, and any remaining factors.

4. Given $f(x) = 2x^4+3x^3-5x^2+3x+2$. If k is a non-zero real root of $f(x) = 0$, show that $\frac{1}{k}$ is a also a root.

5. Find all possible roots of the polynomial equation where $x \in C$.

      a. $2x^3+5x^2+14x+6=0$
      b. $8x^4=x$
      c. $x^2(4x^2+17)=15$

6. Sketch a possible graph for each polynomial function, using the intercepts and end behavior of the function.

      a. $y=2x^3-12x^2+18x$

      b. $y=-x^3+4x^2+x-4$

      c. $y=x^4-8x^2+16$

7. Explain why

      a. $15x^5+4x^4+9x^2+7x+380=0$ has at least one real root.

      b. $5x^6+3x^4+8x^2+120=0$ has no real roots.

8. Solve each of the following polynomial inequalities using a graphical approach, $x \in R$.

      a. $-2x(x+2)(x-3)<0$

      b. $(x+4)(x+1)(x-2)^2 \le 0$

9. Solve each of the following polynomial inequalities using an interval sign table, $x \in R$

a. $2(x+3)(x-1)(x-5) \leq 0$

b. $-3(x+4)(x-3)^3 > 0$

10. Suppose $P(x)$ is a quadratic whose coefficients are all odd integers. Prove that $P(x)=0$ has no rational roots.