

Advanced Precalculus
Unit 2 Review

Name: _____

Polynomial Basics

(Use the Calculator to identify what's requested... use 3 decimal places where applicable)

- 2.) Find the real zeros of $f(x) = 42x^4 + 73x^3 - 130x^2 - 101x + 60$.
- 3.) Find the maximum points of $f(x) = x^5 - 4x^3 + 3x^2 + 3$.
- 4.) Find the minimum points of $f(x) = -x^7 + 5x^3 - 4x^2 + x + 2$.
- 5.) Find the increasing intervals of $f(x) = x^4 + 3x^3 - 5x^2 + 2x + 1$.
- 6.) Find the decreasing intervals of $f(x) = -x^5 + 4x^4 - 3x^2 + 1$.

Polynomial Division

Write each answer in $P(x) = D(x)Q(x) + R(x)$ form.

- 1.) $\frac{x^{10}-1}{x-1}$
- 2.) $\frac{x^9+x^8-x^6-x^5+3x^3+5x^2+3x+58}{x+1}$
- 3.) $\frac{x^5+3x^4-3x^3-7x^2+5x+7}{x+3}$
- 4.) $\frac{x^5+4x^4-2x^3-17x^2-23x+54}{x^2+3x-4}$
- 5.) $\frac{5x^5+2x^4-15x^3+4x^2+9x+22}{5x+2}$
- 6.) $\frac{x^8-2x^6-3x^5+2x^4+7x^3-3x^2-2x-4}{x^3-2x}$

Rational Zeros Theorem / Remainder Theorem / Factor Theorem

- 1.) What are the possible rational zeros of $f(x) = -2x^5 + 18x^3 - 51x + 5$?
- 2.) Is $(x+2)$ a factor of $x^5 - 2$?
- 3.) What is the remainder when $x^{100} - 5x^{71} + 3x^{49} - 2x^3 + 3x^2 + 4$ is divided by $(x+1)$?
- 4.) What are the possible rational zeros of $f(x) = 8x^{10} - 4x^7 + 3x^5 + 3x^{11} - 2x^2 + x - 4$?
- 5.) Find k so that $(x+3)$ is a factor of $x^4 + 6x^3 + 4x^2 + kx + 3$.
- 6.) Suppose a polynomial $P(x)$ has a remainder of 1 when divided by $(x-3)$ and a remainder of 7 when divided by $(x+1)$. What is the remainder when $P(x)$ is divided by $(x-3)(x+1)$?

Factoring Completely

- 4.) $f(x) = 16x^4 - 40x^2 + 9$
- 5.) $f(x) = 18x^4 + 27x^3 + x^2 - 12x - 4$
- 6.) $f(x) = -36x^6 - 60x^5 + 80x^4 + 248x^3 + 204x^2 + 68x + 8$

Finding Zeros

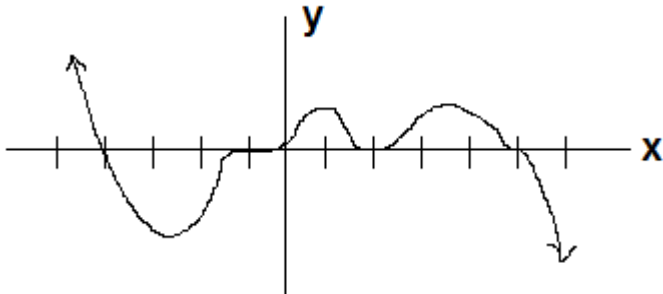
- 4.) Find all zeros in exact form of
 $P(x) = x^5 - x^4 - 11x^3 + 9x^2 + 26x - 24$.
- 5.) Given that $x = 3 + \sqrt{2}$ is a zero of $P(x)$, find all zeros (in exact form) of
 $P(x) = x^5 - 15x^4 + 86x^3 - 230x^2 + 277x - 119$.
- 6.) Given that both $x = 1 + \sqrt{5}$ and $x = -2 + i$ are zeros of $P(x)$, find all zeros (in exact form) of
 $P(x) = x^6 + 2x^5 - 6x^4 - 24x^3 - 27x^2 - 26x - 20$.

Solving Equations

- 5.) Solve the equation (in exact form): $x^6 + 15x^2 = 9x^4 + 7$
- 6.) Solve the equation (in exact form) given that $x = 5 - 2\sqrt{6}$ is a solution
 $3x^5 + 25x^3 + 52x = 31x^4 + 125x^2 + 4$

Graphs of Polynomials

- 5.) Write a possible factored form for $y = f(x)$ pictured below, given it is of degree 13.



- 6.) Sketch a graph (without copying a calculator screen) of
 $f(x) = x^9 - 6x^7 - 2x^6 + 12x^5 + 6x^4 - 10x^3 - 6x^2 + 3x + 2$

Polynomial Inequalities

Solve the inequality and write your answer in interval notation.

- 4.) $x^4 - 7x^3 + 8x^2 + 28x < 48$
- 5.) $x^5 + x^4 + 8x < 5x^3 + x^2 + 4$
- 6.) $x^4 + 2x^3 \geq 4x^2 + 10x + 5$

Tricky Problems

- 6.) Find values of a and b so that $x^2 + x - 1$ is a factor of $ax^3 + bx + 2$.
- 8.) Find values of a and b so that $x = 1$ is a zero twice for $x^4 - 2x^3 + 4x^2 + ax + b$.
- 10.) Find the remainder when dividing $x^{2012} - 3x^{1001} + 1$ by $x^2 - 1$.