

Math 130 Precalculus Spring 10 Review questions

- (1) Consider the two statements:

$$2x^3 - 7x^2 + 2x + 3 = (x + 1)(2x^2 - 9x + 11) - 8$$

$$2x^3 - 7x^2 + 2x + 3 = (x - 1)(2x^2 - 5x - 3)$$

- (a) For which values of x are the statements true?
(b) Which value of x is definitely a root of the polynomial?
(c) Which value of x is definitely not a root of the polynomial?
- (2) Find the domain and the range of the following function and sketch its graph.

$$f(x) = \sqrt{16 - x^2} - 1$$

- (3) Make a hand-drawn graph of

$$f(x) = \begin{cases} -x^2 & \text{for } x \geq 0 \\ x^2 & \text{for } x < 0 \end{cases}$$

What symmetries, if any, does the graph have?

- (4) Find the equation of the graph obtained by reflecting the graph of $f(x) = \sqrt{x}$ across the y-axis and shifting it 3 units to the right and then expanding it in the vertical direction by a factor of 4.
- (5) Given $u = 2 - i$ and $v = 1 + 3i$, compute $u + v$, $u - v$, uv , u/v and v/u .
- (6) Consider $f(x) = 2x^3 - 4x$. Check f algebraically for symmetries. Graph f using the calculator and find (using the calculator) all zeros, local maxima and local minima.
- (7) Let $p(x) = 6x^3 + 7x^2 - 1$.
- (a) Give a complete list of all possible rational zeros.
(b) Check, using long division, whether or not $x = 1$ and $x = \frac{1}{3}$ are actual rational zeros.
(c) Find all remaining zeros.
(d) Write p as a product of linear factors.
(e) Sketch the graph of p .
- (8) Consider the function

$$f(x) = \frac{x^2 + x - 2}{x^3 + 3x^2 - 6x - 8}$$

- (a) Find the domain of f and the vertical asymptotes.
(b) Find the horizontal asymptote of f .

- (c) Find the zeros of f and $f(0)$.
 - (d) Does the graph of f intersect with its horizontal asymptote? Check algebraically!
 - (e) Sketch the graph of f .
- (9) Consider the polynomials p and q given by
- $$p(x) = x^4 - 3x^3 + 18x^2 - 48x + 32, \quad q(x) = x^2 + 16$$
- (a) Calculate $\frac{p}{q}$ using long polynomial division.
 - (b) Find all real and complex zeros of p .