

Part I

1. Graphs of polynomial and rational functions.

For each of the following functions f , complete the following.

- i. Find the domain of f .
- ii. List all zeros of f .
- iii. What is the y -intercept of the graph of f ?
- iv. Find all vertical asymptotes of the graph of f .
- v. Find all horizontal asymptotes of the graph of f .
- vi. List all intervals where $f(x)$ is positive.
- vii. List all intervals where $f(x)$ is negative.
- viii. Using 'arrow' notation, describe the end behavior of f and the behavior of f at the vertical asymptotes.
- ix. Sketch of the graph of f .

(a) $f(x) = \frac{3x^2 + 6x + 3}{x^2 - 25}$ (b) $f(x) = \frac{x^2 + 9}{x^2 - 9}$ (c) $f(x) = (x - 3)^3(x + 4)^2$ (d) $f(x) = (x - 3)(x^2 + 4)$

2. Difference quotients.

For each of the following functions f , find and simplify $\frac{f(x+h) - f(x)}{h}$ and its value as $h \rightarrow 0$.

(a) $f(x) = 5x - 3$ (b) $f(x) = 7 + 3x - x^2$ (c) $f(x) = \frac{2}{x-1}$ (d) $f(x) = \sqrt{x+3}$

3. **Proving trigonometric identities.** See handout

4. **Solving trigonometric equations.** See handout

5. **Lines.** Know everything

Part II

6. **More problems.** See old exams and quizzes.