

This part of the test has pages 2 – 7. Take a moment to make sure you have them all.

2 Recall the formula

$$NQ = \frac{f(x+h) - f(x)}{h}$$

Expand and simplify NQ for the case where $f(x) = 17 - 2x - 3x^2$.

3 Let $f(x) = \frac{5x - 5}{x - 3}$

(a) Find a formula for f^{-1} .

(b) Make a rough graph of the function f Label the salient features of your graph (intercepts and asymptotes) directly with their coordinates or equations.

- 4 Show steps in factoring the polynomial $P(x) = x^5 + x^4 + 3x^3 + 3x^2 - 4x - 4$ down to degree-one factors. Be sure to write down the factorization at the end of your work.

5 Let $\mathbf{a} = 4 + 3i$. and $\mathbf{b} = 3 - 5i$. Compute the value of $\frac{\mathbf{a}}{\mathbf{b}}$, in standard complex-number form.

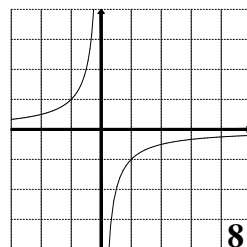
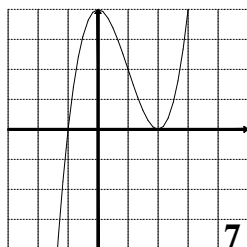
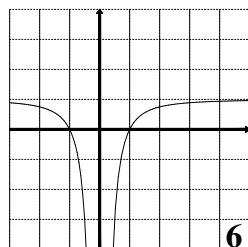
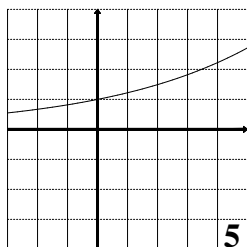
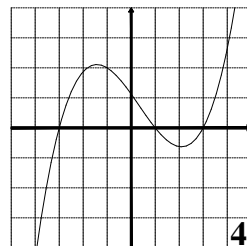
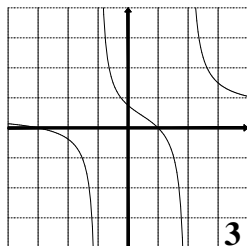
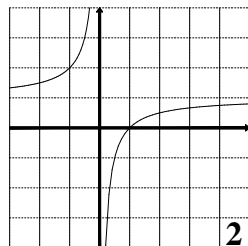
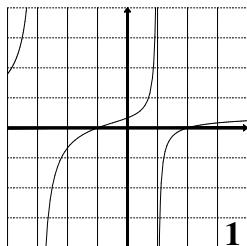
6 Show steps in finding all the zeros of $Q(x) = x^2 + 4x + 13$

- 7 Use factoring and long division to make a graph of

$$f(x) = \frac{x^2 + 8x + 15}{x^2 - 8x + 15}$$

Label the salient points (intercepts, asymptotes) of your graph directly with their coordinates or equations. Be sure to show the function graph in proper relation to its asymptotes.

8 The numbered graphs show parts of graphs of various functions. Fill each blank with the graph number best corresponding to the function. The coordinate lines are one unit apart.



(a) _____ $y = \frac{(x + 1)(x - 2)}{2(x - 1)(x + 3)}$

(e) _____ $y = e^{2x/5}$

(b) _____ $y = \frac{(x - 1)(x + 3)}{2(x + 1)(x - 2)}$

(f) _____ $y = 1 - x^{-2}$

(c) _____ $y = \frac{1}{8}(x - 1)(x^2 - 9)$

(g) _____ $y = \frac{x - 1}{x}$

(d) _____ $y = (x + 1)(x - 2)^2$

(h) _____ $y = -x^{-1}$