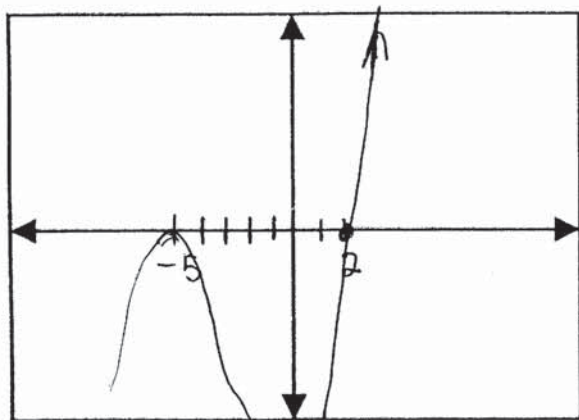


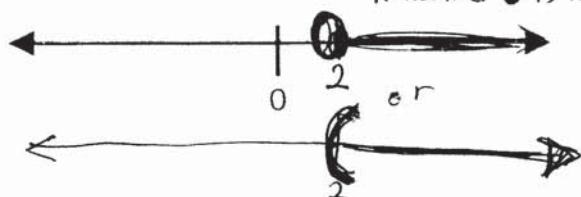
# POLYNOMIAL FUNCTIONS GRAPHING LAB

1) Function:  $P_1(x) = (x-2)(x+5)^2$

a) Standard view:  $(-10, 10)$  by  $(-10, 10)$

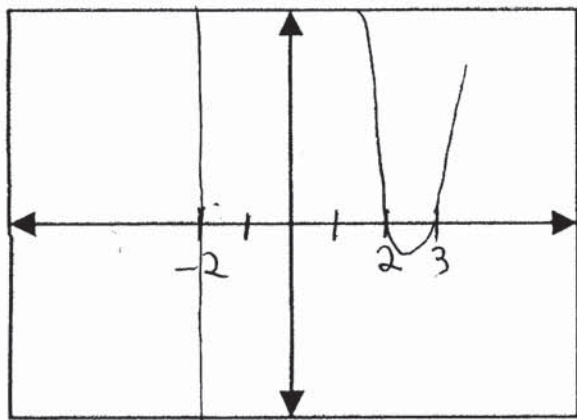


d) Value where the function is positive:



2) Function:  $P_2(x) = 2(x-2)(x+2)(x-3)$

a) Standard view:  $(-10, 10)$  by  $(-10, 10)$



d) Value where the function is positive:

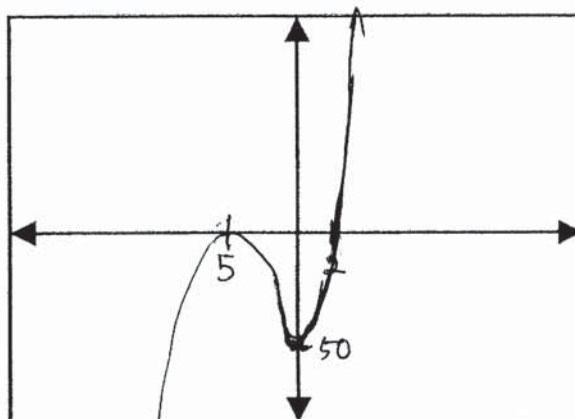


Adapted from *College Preparatory Mathematics Mathematics 3*.

UCLA Math Content Programs for Teachers  
Behavior of Polynomials 2: Cubics and More

b) Roots/x-intercepts/zeros: -5 and 2

c) Better view:



g) Description:

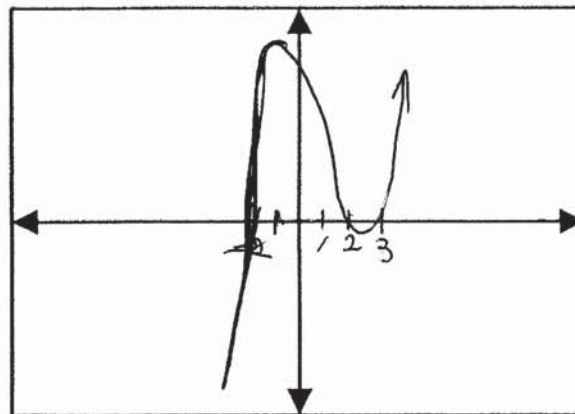
As  $x \rightarrow \infty$ ,  $p(x) \rightarrow \infty$

$A_5 \quad x \rightarrow -\infty, p(x) \rightarrow -\infty$

There are three turns.

b) Roots/x-intercepts/zeros: -2, 2, 3

c) Better view:



e) Description:

$P_2(x)$  is positive where  $x \in [-2, 2] \cup [3, \infty)$

3 turns

As  $x \rightarrow \infty$ ,  $y \rightarrow \infty$  BP

BP2 – PP8

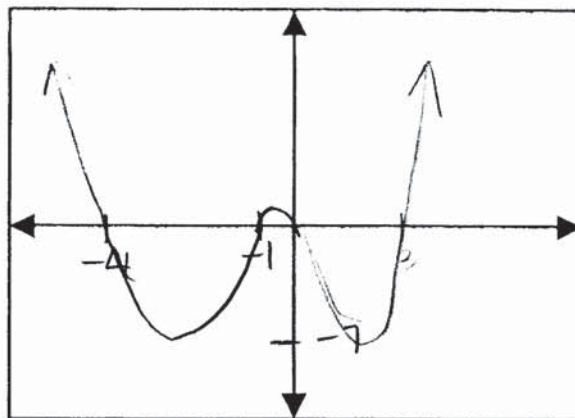
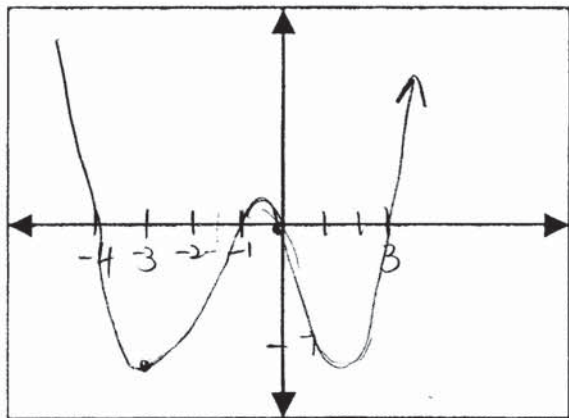
As  $x \rightarrow -\infty$ ,  $y \rightarrow -\infty$

3) Function:  $P_3(x) = 0.2x(x+1)(x-3)(x+4)$   
 $\begin{matrix} x=0 & -1 & 3 & -4 \end{matrix}$

b) Roots/x-intercepts/zeros: 0, -1, 3, -4

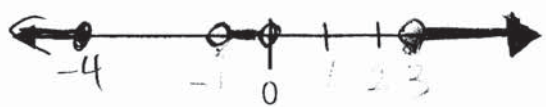
a) Standard view: (-10,10) by (-10,10)

c) Better view:



d) Value where the function is positive:

e) Description:

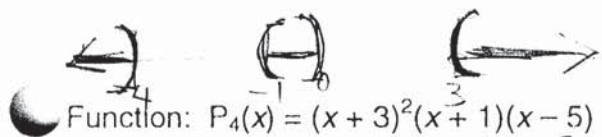


where  $x \in (-\infty, -4) \cup (-1, 0) \cup (3, \infty)$ ,  
 $P_3(x)$  is positive

As  $x \rightarrow \infty$ ,  $P(x) \rightarrow \infty$

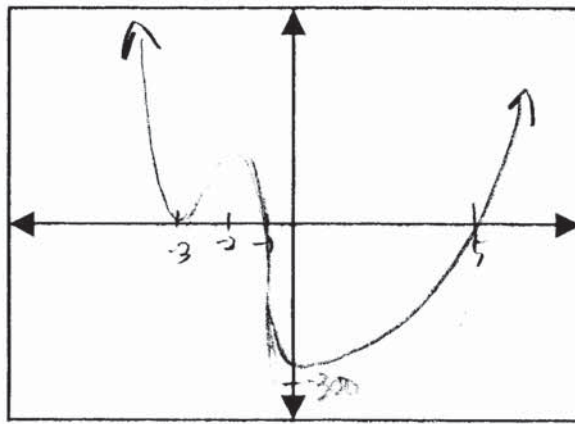
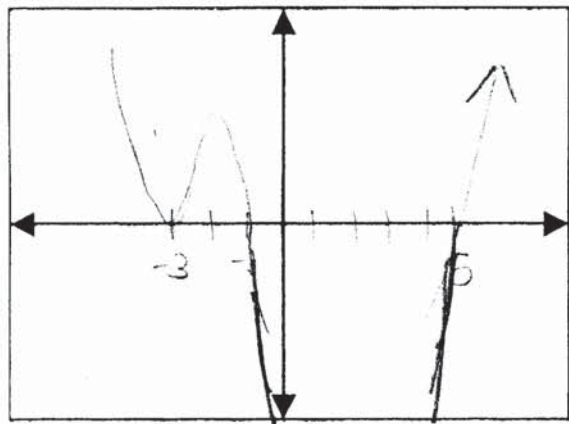
As  $x \rightarrow -\infty$ ,

4 turns



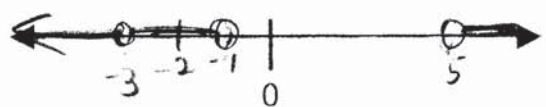
b) Roots/x-intercepts/zeros: -3, -1, 5

c) Better view:



d) Value where the function is positive:

e) Description:



$P_4(x)$  is positive where  
 $x \in (-\infty, -3) \cup (-1, 5) \cup (5, \infty)$

4 turns

As  $x \rightarrow \infty$ ,  $y \rightarrow \infty$

As  $x \rightarrow -\infty$ ,  $y \rightarrow -\infty$

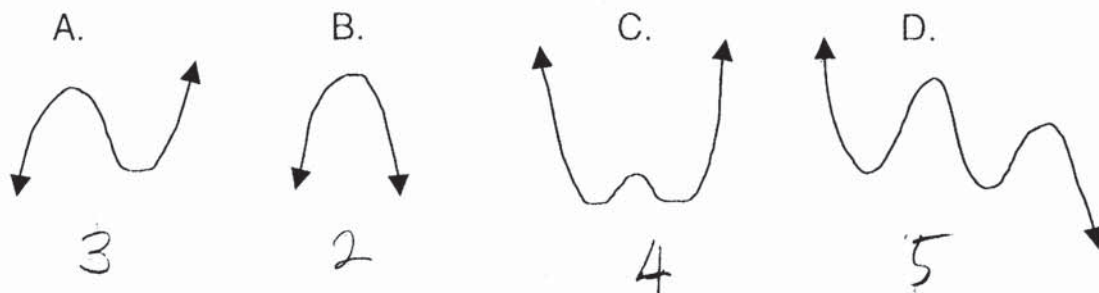
BP2 - PP9

Adapted from College Preparatory Mathematics, Mathematics 3.

# SUMMARIZING OBSERVATIONS ABOUT POLYNOMIAL FUNCTIONS

Look back at the work you did on the Polynomial Functions Lab. Then answer the following questions.

- 1) What is the maximum number of roots a polynomial of degree 3 can have? 3
- 2) What do you think is the maximum number of roots a polynomial of degree  $n$  can have?  $n$
- 3) Can a polynomial of degree  $n$  have fewer than  $n$  roots? Under what conditions? Yes, when the binomial zero has exponents equal or greater than 2. For example, #1 has 2 roots for the
- 4) For each function below, state the minimum degree its polynomial equation could have. Not roots graph



- 5) Which of the graphs above have a negative orientation? (They are opposite of their parent graphs.) Explain how you determine the orientation of a graph.

B and D. All parent graphs of even and odd functions approach  $\infty$  as  $x \rightarrow \infty$ . In B and D,  $y \rightarrow -\infty$  as  $x \rightarrow \infty$

Adapted from College Preparatory Mathematics, Mathematics 3.