Name
Date
Course

Polynomials (Part III): Graphs of Polynomial Functions and Finding Polynomials Given Their Zeros

Write a polynomial function in standard form that has the following zeros, leading coefficient (LC), and degree (D).

① $-2, -4, 5$ $LC=4$ $D=3$

② $1, 2, 3, 4$ $LC=1$ $D=4$

③ $i, -3$ $LC=5$ $D=3$

④ $2-2i, -1, 1$ $LC=1$ $D=4$

⑤ $-3i, -5, 10$ $LC = -1$ $D = 4$

Indicate the end behavior for each function.

⑥ $f(x) = 6x^4 - x^3 + 2x - 11$

End Behavior:

⑦ $f(x) = -x^2 + 20x + 16$

End Behavior:

⑧ $f(x) = 5x^5 - 7x^4 + 3x^3 - 9x^2 + 4x - 2$

End Behavior:

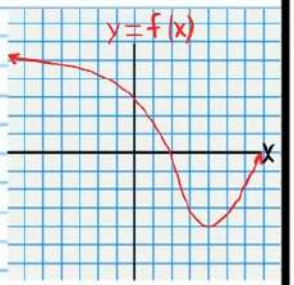
⑨ $f(x) = -8x^3 - 19x^2 - 18x - 3$

End Behavior:

The graphs of various functions are written below. Write the intervals where each function is increasing or decreasing.

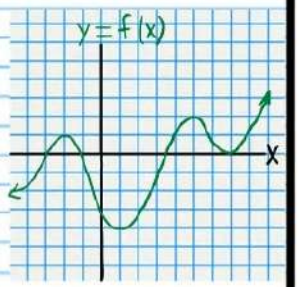
⑩ Increasing:

Decreasing:



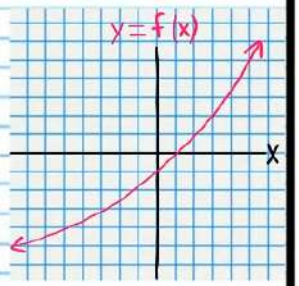
(11) Increasing:

Decreasing:



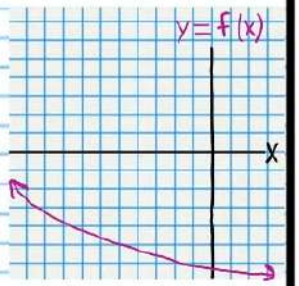
(12) Increasing:

Decreasing:



(13) Increasing:

Decreasing:



For each polynomial function, state the maximum number of turning points of the corresponding graph.

(14) $f(x) = -x^2 + 20x + 16$

Max # of Turning Points:

(15) $f(x) = 5x^5 - 7x^4 + 3x^3 - 9x^2 + 4x - 2$

Max # of Turning Points:

(16) $f(x) = -x^7 - x - 2$

Max # of Turning Points:

Polynomial functions are written below in factored form. Write the x-intercepts of each corresponding graph and determine if the function crosses or touches the x-axis at each intercept.

(17) $f(x) = -(x-5)^2(x-\sqrt{6})^6(x+1)^2$

(18) $f(x) = 3(x+10)^5(x+3)^9$

(19) $f(x) = (x-2\pi)^{50}(x+17)^{31}(x+8.64)^{28}(x-102)^{21}$

Answers

(1) $f(x) = 4x^3+4x^2-88x-160$

(2) $f(x) = x^4-10x^3+35x^2-50x+24$

(3) $f(x) = 5x^3+15x^2+5x+15$

(4) $f(x) = x^4-4x^3+7x^2+4x-8$

(5) $f(x) = -x^4+5x^3+41x^2+45x+450$

(6) As $x \to \infty$, $f(x) \to \infty$

As $x \to -\infty$, $f(x) \to \infty$

(7) As $x \to \infty$, $f(x) \to -\infty$

As $x \to -\infty$, $f(x) \to -\infty$

(8) As $x \to \infty$, $f(x) \to \infty$

As $x \to -\infty$, $f(x) \to -\infty$

(9) As $x \to \infty$, $f(x) \to -\infty$

As $x \to -\infty$, $f(x) \to \infty$

(10) Increasing: $(4,7)$

Decreasing: $(-7,4)$

(11) Increasing: $(-5,-2)$ and $(1,5)$ and $(7,9)$

Decreasing: $(-2,1)$ and $(5,7)$

(12) Increasing: $(-8,6)$

Decreasing: X

(13) Increasing: X

Decreasing: $(-11,3)$

(14) 1

(15) 4

(16) 6

(17) $5 \Rightarrow$ Touches

$\sqrt{6} \Rightarrow$ Touches

$-1 \Rightarrow$ Touches

(18) $-10 \Rightarrow$ Crosses

$-3 \Rightarrow$ Crosses

(19) $2\pi \Rightarrow$ Touches

$-17 \Rightarrow$ Crosses

$-8.64 \Rightarrow$ Touches

$102 \Rightarrow$ Crosses