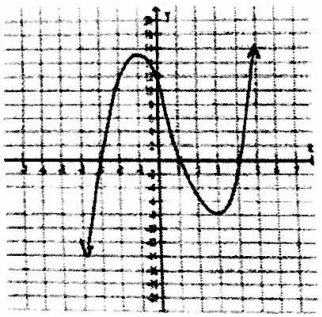
4.4 - Function Analysis

Fill in the missing information.

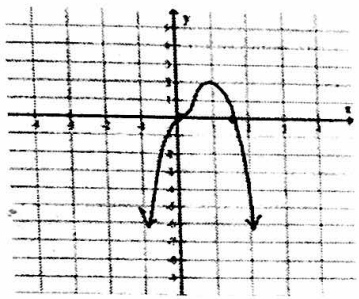
Polynomial Function	Classification by Degree	Classification by Terms	End Behavior
1. $f(x) = 3x^2 - 5$	Quadratic	Binomial	as $x \to \infty$ $f(x) \to \infty$ as $x \to -\infty$ $f(x) \to \infty$
2. $y = -x^4 + 6x - 1$	Quartic	trinomial	as $x \to \infty$ $f(x) \to -\infty$ as $x \to -\infty$ $f(x) \to -\infty$
3. $g(x) = 6x$	Linear	monomial	as $x \to \infty$ $f(x) \to \infty$ as $x \to -\infty$ $f(x) \to -\infty$
4. $h(x) = 5x^2 - 2x^3 + 7x - 3$	Cubic	Polynomial	as $x \to \infty$ $f(x) \to -\infty$ as $x \to -\infty$ $f(x) \to \infty$

Identify the zeroes of each function below. Be sure to state any multiplicity. Then state the intervals over which the function is increasing and decreasing.

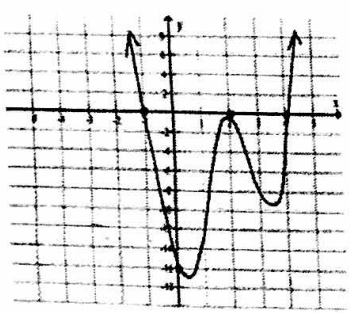
5.



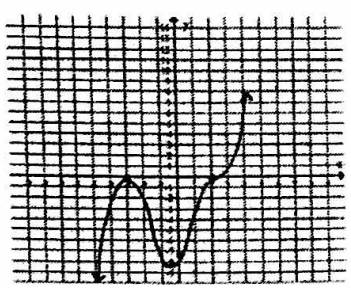
6.



7.



8.



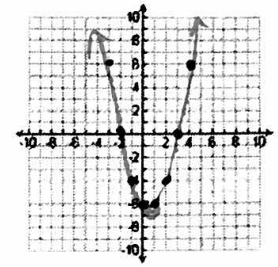
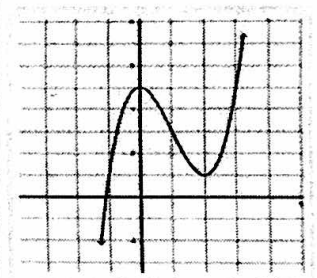
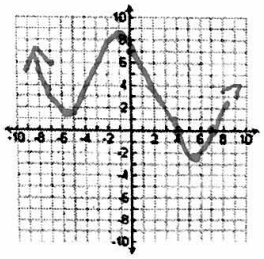
5) x = -3 mult. 1
x = 1 mult. 1
x = 4 mult. 1
inc: $(-\infty, -1) \cup (3, \infty)$
dec: $(-1, 3)$

6) x = 0 mult. 3
x = 1.5 mult. 1
inc: $(-\infty, 1)$
dec: $(1, \infty)$

7) x = -1 mult. 1
x = 2 mult. 2
x = 4 mult. 1
inc: $(1.5, 2) \cup (3.5, \infty)$
dec: $(-\infty, 1.5) \cup (2, 3.5)$

8) x = -3 mult. 2
x = 2 mult. 3
inc: $(-\infty, -3) \cup (-\frac{1}{2}, \infty)$
dec: $(-3, -\frac{1}{2})$

Use the given information to complete the missing columns.

Table of Values	Graph	Key Features of Function
x: -3, -2, -1, 0, 1, 2, 3, 4 y: 6, 0, -4, -6, -6, -4, 0, 6		as $x \to \infty$ $f(x) \to \infty$ as $x \to -\infty$ $f(x) \to \infty$ x = -2 mult. 1 x = 3 mult. 1 degree = 2 inc: $(\frac{1}{2}, \infty)$ dec: $(-\infty, \frac{1}{2})$ pos: $(-\infty, -2) \cup (3, \infty)$ neg: $(-2, 3)$ abs. min = -7
x: -3, -2, -1, 0, 1, 2, 3, 4 y: 6, 0, -4, -6, -6, -4, 0, 6 0, 2, -1, 1, 3 5, 1, 1, 3, 5		as $x \to \infty$ $f(x) \to \infty$ as $x \to -\infty$ $f(x) \to -\infty$ ~~x = 4~~ mult. 1 x = -1, 2? degree = 3 inc: $(-\infty, 0) \cup (2, \infty)$ dec: $(0, 2)$ pos: $(-1, \infty)$ neg: $(-\infty, -1)$ rel max = 5 rel min = 1
x: -3, -2, -1, 0, 1, 2, 3, 4 y: 6, 0, -4, -6, -6, -4, 0, 6 0, 4, 7, -5.5, 5.5, -1 7, 0, 0, 1.5, -2.5, 8.5		The y-intercept is $(0, 7)$. The zeroes are located at $x = 4$ and $x = 7$. There is a relative minimum at $(-5.5, 1.5)$ and at $(5.5, -2.5)$. A relative maximum is located at $(-1, 8.5)$. The polynomial is quartic.