AP Precalculus

Name: _____ Date:_____

Corrective Assignment

Unit 1A CA – Polynomial and Rational Functions

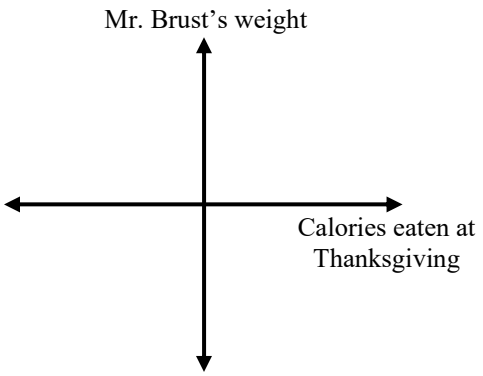
For each function, identify what the dependent and independent variables represent.

1. $r(c)$ is a function where c is the number of coyotes and r is the number of rabbits on the property.

Dep:

Indep:

2.



Dep:

Indep:

3. Let the function f be increasing or decreasing, but not both. State whether the function is increasing or decreasing on the given interval and justify your answer.

x	15	30	50	75	110
$f(x)$	43	40	35	25	12

4.

a. On what interval(s) is the graph concave up?

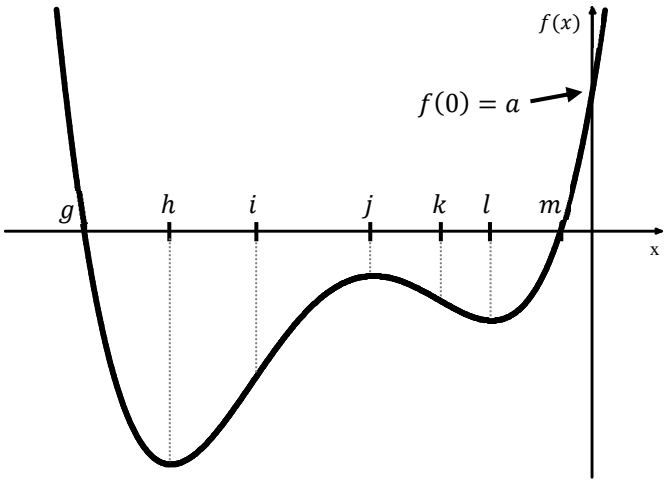
b. On what interval(s) is the graph concave down?

c. On what interval(s) is the graph increasing?

d. On what interval(s) is the graph decreasing?

e. Find the zeros of the function.

f. Find the y-intercept of the function.



5. **Calculator active.** Find the average rate of change of the function $h(t) = t + 3^t$ on the interval $\frac{1}{2} \leq x \leq 1$.

6. Using the information in the table below, find the average rate of change for each interval.

t weeks	2	4	6	8
$B(t)$ wild boar	2	12	17	20

a. $2 \leq t \leq 8$

b. $6 \leq t \leq 8$

c. $2 \leq t \leq 6$

7. **Calculator active.** Estimate the rate of change of $f(x) = \frac{1}{x}$ at $x = 2$.

8. Increasing the number of cigarettes someone smokes increases their chance of lung cancer. Does this scenario represent a positive or negative rate of change?

What is the average rate of change for each function on the given intervals?

9. $y = 3x - 6$ on $2 \leq x \leq 5$

10. $y = -x^2 + 3x + 4$ on $-2 \leq x \leq 1$

What is the rate of change of the average rates of change for each function over consecutive equal-length intervals?

11. $y = 7 - 3x$

12. $f(x) = 2x^2 + 3x - 6.$

13. The values of a function are given at selected x-values in the table below. The function's concavity does not change. Determine if the function is concave up or concave down. Justify your answer.

$\boldsymbol{x}$	6	8	10	12	14
$\boldsymbol{g(x)}$	8	6	0	-14	-34

Find the leading coefficient and the degree of each polynomial.

14. $f(x) = 4x^2 - 3$

L.C. _____ Degree: _____

15. $f(x) = -8x^3 + 5 + 9x^4$

L.C. _____ Degree: _____

Let $\boldsymbol{f(x)}$ be a polynomial function with the given values. Are there any guaranteed extrema? If so, state where they occur.

16. $f(-13) = 0, f(0) = 5,$ and $f(2) = 3.$

17. $f(-1) = 0, f(0) = -8, f(4) = -3,$ and $f(6) = 0.$

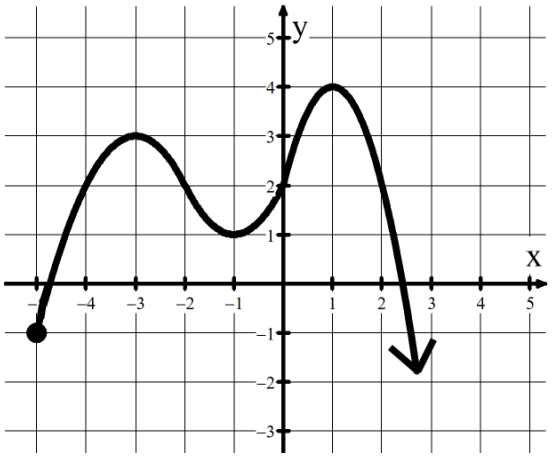
Is there a global maximum or minimum for each function?

18. $f(x) = -2x^7 + 1$

19. $f(x) = 3x^4 - 4x^3 - 2$

20. $f(x) = -2x^6 + 7x^5 - x^3 + x$

Find the following extrema. If there are none, cross it off and write NONE.



21. Absolute **min** of _____ when $x =$

22. Absolute **max** of _____ when $x =$

23. Relative **min**(s) at $x =$

24. Relative **max**(es) at $x =$

For each polynomial function, find the intervals for each condition.

25. $f(x) = -x^2 - 4x + 45$. When is $f(x) \geq 0$?

26. $g(x) = (x+5)^2(x-1)^3(x-6)$. When is $g(x) \geq 0$?

For each polynomial, the degree is listed along with all of its real zeros. Find the number of NON-REAL zeros the polynomial has.

27. The degree of a polynomial is 5 with real zeros at $x = -3, x = 0$, and $x = 2$. $x = 2$ has a multiplicity of 3.

28. The degree of a polynomial is 10 with real zeros at $x = -5, x = -2$, and $x = 11$. $x = 11$ has a multiplicity of 4.

Given one non-real zero of a polynomial, find another zero.

29. $9 + 2i$

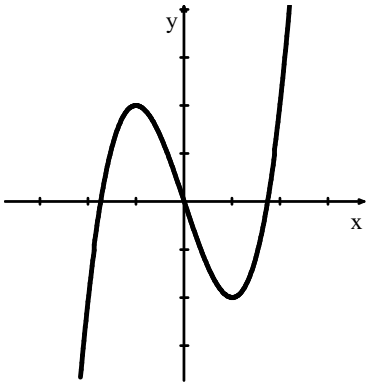
30. $-8 - i$

31. Find the **degree** of the polynomial from the given input and output values.

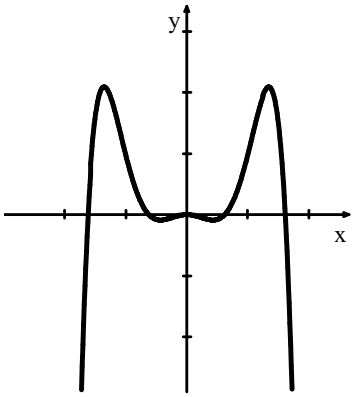
Input	0	1	2	3	4	5	6	7
Output	100	107	118	115	80	-5	-158	-397

State whether the following graphs represent functions that are even, odd, or neither.

32.



33.



State if the following functions are even, odd, or neither.

34. $f(x) = x^4 + x + 1$

35. $f(x) = 6x^5 - 2x^3 + x$

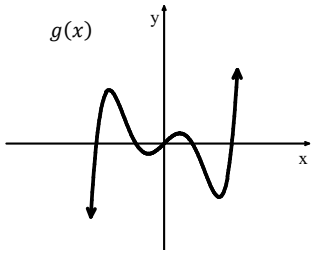
36. $f(x) = 3 + 5x^6 - 3x^2$

Describe the end behavior of each function using limit notation.

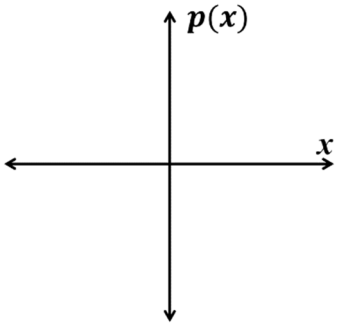
37. $f(x) = 7x^4 - 12$

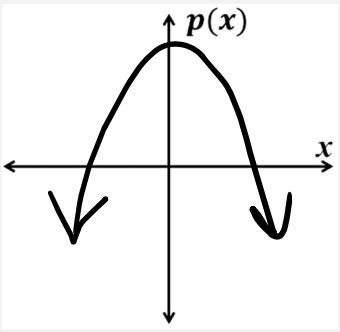
38. $p(x) = -8x^{13} - 6x^4 + x$

39.



40. Sketch the graph of a polynomial function that could match statements $\lim_{x\to-\infty} p(x) = -\infty$ and $\lim_{x\to\infty} p(x) = -\infty$.



Answers to Unit 1A Corrective Assignment

1. Dependent: Number of rabbits. Independent: Number of coyotes.			2. Dependent: Mr. Brust's weight. Independent: Calories eaten at Thanksgiving.		
3. f is decreasing on the interval $15 < x < 110$ because for all a and b in the interval, if $a < b$, then $f(a) > f(b)$.			4a. $x < i$ and $x > k$	4b. $i < x < k$	
4c. $h < x < j$ and $x > l$	4d. $x < h$ and $j < x < l$		4e. $x = g$ and $x = m$	4f. $y = a$	
5. 3.5358	6a. 3 wild boar per week	6b. 1.5 wild boar per week	6c. 3.75 wild boar per week		
7. ≈ -0.25	8. positive	9. 3	10. 4	11. 0	12. 4
13. Concave down because the rate of change is decreasing over equal-length input-value intervals.			14a. 4	14b. 2	15a. 9	15b. 4
16. Yes, on $-13 < x < 2$.	17. Yes, on $-1 < x < 4$.		18. none	19. min	20. max
21. none	22. max of 4 when $x = 1$		23. -5 and -1	24. -3 and 1	
25. $[-9, 5]$	26. $(-\infty, 1] \cup [6, \infty)$	27. 0	28. 4	29. $9 - 2i$	30. $-8 + i$
31. 3	32. odd	33. even	34. Neither	35. Odd, $f(-x) = -f(x)$	
36. Even, $f(-x) = f(x)$	37. $\lim_{x\to-\infty} f(x) = \infty$ and $\lim_{x\to\infty} f(x) = \infty$		38. $\lim_{x\to-\infty} p(x) = \infty$ and $\lim_{x\to\infty} p(x) = -\infty$		
39. $\lim_{x\to-\infty} g(x) = -\infty$ and $\lim_{x\to\infty} g(x) = \infty$			40.