Student: _____ **Instructor:** Andreas Lazari **Assignment:** Section 3.2 Homework
Date: _____ **Course:** Math1111-Summer2018

1. Determine whether the function is a polynomial function. If it is, identify the degree.

$f(x) = 2x^3 + 6x^6$

Choose the correct choice below and, if necessary, fill in the answer box to complete your choice.

- (●) **A.** It is a polynomial. The degree of the polynomial is 6.
- ( ) **B.** It is not a polynomial.

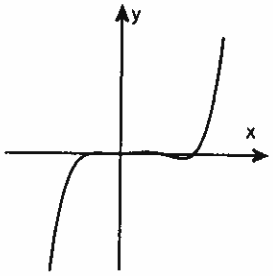
2. Determine whether the function is a polynomial function. If it is, identify the degree.

$h(x) = 7x^5 + 6x^3 + \frac{5}{x}$

Choose the correct choice below and, if necessary, fill in the answer box to complete your choice.

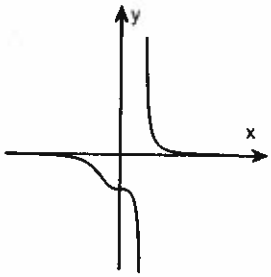
- ( ) **A.** It is a polynomial. The degree of the polynomial is _____.
- (●) **B.** It is not a polynomial.

3. Is the graph on the right a polynomial function?



- (●) Yes
- ( ) No

4. Is the graph on the right the graph of a polynomial function?



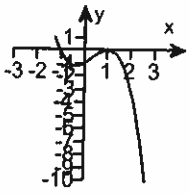
- ( ) Yes
- (●) No

5. Use the leading coefficient test to determine the end behavior of the graph of the given polynomial function. Then use this end behavior to match the polynomial function with its graph.

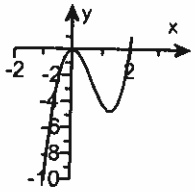
$f(x) = -x^4 + x^2$

Choose the correct graph below.

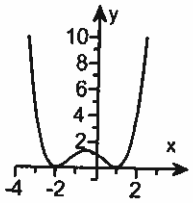
○ A.



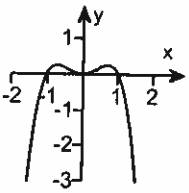
○ B.



○ C.



● D.



6. Answer parts **a.**—**e.** for the function shown below.

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

a. Use the leading coefficient test to determine the graph's end behavior. Which statement describes the behavior at the ends of $f(x) = x^3 + 4x^2 - x - 4$?

- ○ **A.** The graph rises to the left and falls to the right.
- ● **B.** The graph falls to the left and rises to the right.
- ○ **C.** The graph falls to the left and to the right.
- ○ **D.** The graph rises to the left and to the right.

b. Find the x-intercepts. State whether the graph crosses the x-axis, or touches the x-axis and turns around, at each intercept. What are the x-intercepts?

$x =$ $-1, 1, -4$

(Type an integer or a decimal. Use a comma to separate answers as needed.)

At which x-intercept(s) does the graph cross the x-axis? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ● **A.** $x =$ $-1, 1, -4$

  (Type an integer or a decimal. Use a comma to separate answers as needed.)
- ○ **B.** There are no x-intercepts at which the graph crosses the x-axis.

At which x-intercept(s) does the graph touch the x-axis and turn around? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** $x =$ _____

  (Type an integer or a decimal. Use a comma to separate answers as needed.)
- ● **B.** There are no x-intercepts at which the graph touches the x-axis and turns around.

c. Find the y-intercept.

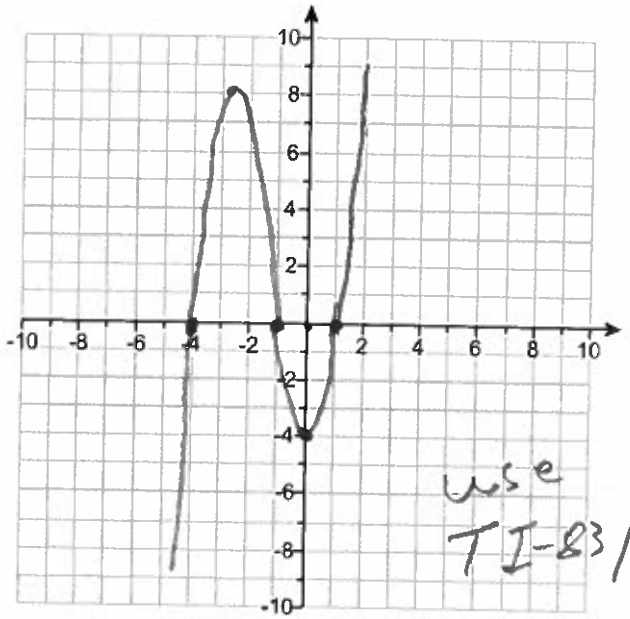
The y-intercept is $y =$ -4.

(Type an integer or a decimal.)

d. Determine whether the graph has y-axis symmetry, origin symmetry, or neither. Choose the correct answer below.

- ○ **A.** y-axis symmetry
- ○ **B.** origin symmetry
- ● **C.** neither

- Use the graphing tool to graph the function. If necessary,



use TI-83/84

Find the x-Intercepts

$x^3 + 4x^2 - x - 4 = 0$

$x^2(x+4) - (x+4) = 0$

$(x+4)(x^2-1)$

$(x+4)(x-1)(x+1) = 0$

$x = -4 ; x = 1, x = -1$

$f(0) = (0)^3 + 4(0)^2 - 0 - 4$

$= -4$

y-Interp; -4.

e. Use the graphing tool to graph the function. If necessary, find a few additional points and graph the function. Use the maximum number of turning points to check whether it is drawn correctly.

7. Use the given function to answer the questions that follow.

$f(x) = x^4 - 4x^2$

a) Use the Leading Coefficient Test to determine the graph's end behavior.

- (●) **A.** The graph of f(x) rises left and rises right.
- ( ) **B.** The graph of f(x) falls left and rises right.
- ( ) **C.** The graph of f(x) falls left and falls right.
- ( ) **D.** The graph of f(x) rises left and falls right.

X-Intercepts:

$x^4 - 4x^2 = 0$

$x^2(x^2 - 4) = 0$

$x^2 = 0 \Rightarrow x = 0$

$x^2 = 4 \Rightarrow x^2 - 2^2 = (x-2)(x+2) = 0$

$x = 2$

$x = -2$

b) Find the x-intercepts.

x = 0, −2, 2.

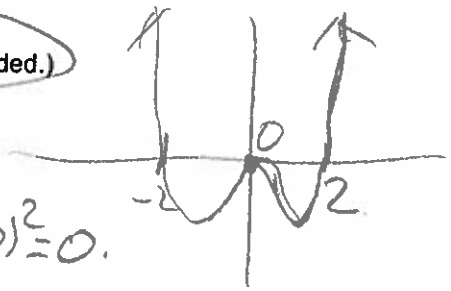
(Use a comma to separate answers as needed.)

At which zeros does the graph of the function cross the x-axis? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ( ) **A.** x = 0, −2, 2 (Use a comma to separate answers as needed.)
- ( ) **B.** There is no solution.

At which zeros does the graph of the function touch the x-axis and turn around? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ( ) **A.** x = 0 (Use a comma to separate answers as needed.)
- ( ) **B.** There is no solution.



c) Find the y-intercept by computing f(0).

f(0) = 0

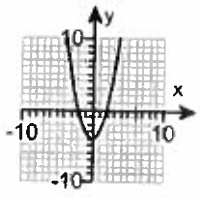
$f(0) = 0^4 - 4(0)^2 = 0.$

d) Determine the symmetry of the graph.

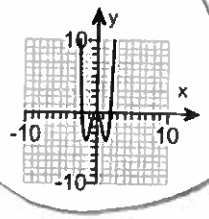
- (●) Even; y-axis symmetry
- ( ) Odd; origin symmetry
- ( ) Neither

e) Determine the graph of the function.

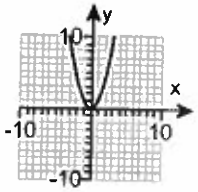
- ( ) **A.**



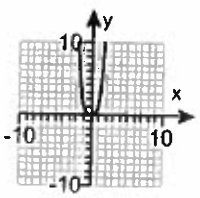
- (●) **B.**



- ( ) **C.**



- ( ) **D.**



7. A. The graph of f(x) rises left and rises right.

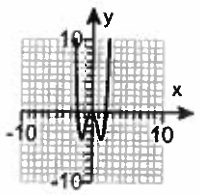
−2,2,0

A. x = **−2,2** (Use a comma to separate answers as needed.)

A. x = **0** (Use a comma to separate answers as needed.)

0

Even; y-axis symmetry



B.

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8. D. The graph of f(x) rises to the left and rises to the right.

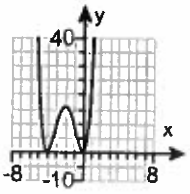
−4,0

B. There are no x-intercepts at which the graph crosses the x-axis.

A. The x-intercept(s) at which the graph touches the x-axis and turns around is/are **−4,0**.
(Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)

0

C. The graph of f is neither symmetric about the y-axis nor symmetric about the origin.



B.

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8. For the polynomial function $f(x) = x^4 + 8x^3 + 16x^2$, answer the parts a through e.

a. Use the Leading Coefficient Test to determine the graph's end behavior.

X-Intercept

$x^4 + 8x^3 + 16x^2 = 0$

$x^2(x^2 + 8x + 16) = 0$

$x^2(x+4)^2 = 0$

$x = 0, \; x = -4$

- ○ **A.** The graph of f(x) falls to the left and falls to the right.
- ○ **B.** The graph of f(x) falls to the left and rises to the right.
- ○ **C.** The graph of f(x) rises to the left and falls to the right.
- ● **D.** The graph of f(x) rises to the left and rises to the right.

b. Find the x-intercept(s). State whether the graph crosses the x-axis, or touches the x-axis and turns around, at each intercept.

The x-intercept(s) is/are $-4, 0$.
(Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)

At which x-intercept(s) does the graph cross the x-axis? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ○ **A.** The x-intercept(s) at which the graph crosses the x-axis is/are _____.
  (Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)
- ● **B.** There are no x-intercepts at which the graph crosses the x-axis.

At which x-intercept(s) does the graph touch the x-axis and turn around? Select the correct choice below and, if necessary, fill in the answer box to complete your choice.

- ● **A.** The x-intercept(s) at which the graph touches the x-axis and turns around is/are $-4, 0$.
  (Type an integer or a decimal. Use a comma to separate answers as needed. Type each answer only once.)
- ○ **B.** There are no x-intercepts at which the graph touches the x-axis and turns around.

c. Find the y-intercept.

$f(0) = 0^4 + 8(0)^3 + 16(0)^2 = 0.$

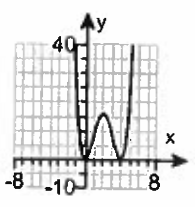
The y-intercept is 0.
(Simplify your answer. Type an integer or a decimal.)

d. Determine whether the graph has y-axis symmetry, origin symmetry, or neither. Choose the correct answer below.

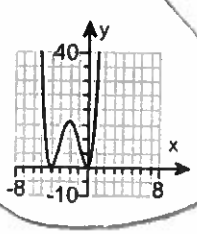
- ○ **A.** The graph of f is symmetric about the y-axis.
- ○ **B.** The graph of f is symmetric about the origin.
- ● **C.** The graph of f is neither symmetric about the y-axis nor symmetric about the origin.

e. If necessary, find a few additional points and graph the function. Use the maximum number of turning points to check whether it is drawn correctly. Choose the correct graph below.

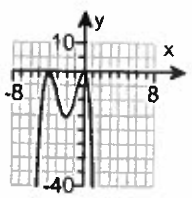
○ **A.**



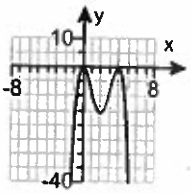
● **B.**



○ **C.**



○ **D.**

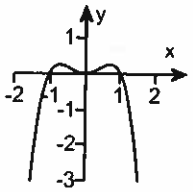


1. A. It is a polynomial. The degree of the polynomial is 6 .

2. B. It is not a polynomial.

3. Yes

4. No

5. 

D.

6. B. The graph falls to the left and rises to the right.

-1,1, -4

A. x = -1,1, -4 (Type an integer or a decimal. Use a comma to separate answers as needed.)

B. There are no x-intercepts at which the graph touches the x-axis and turns around.

-4

C. neither