a 3 Packet

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...FIF.4,

28-32
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C.AAPR.3

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.AAPR.3

Day 5
Problems #17-20
Functions Performance
Task Part A
PC.FLQE.4, PC.AAPR.3

Day 10
Problems #37-40
Functions Performance
Task Part B
A2.AREI.2, PC.AAPR.3

Functions Performance Task

Roller Coaster Crew

Jim and Michelle have summer internships at an engineering firm. As part of their internship, they get to assist in the planning of a brand new roller coaster. For this assignment, you help Jim and Michelle as they tackle the math behind some simple curves in the coaster's track.

Part A

The first part of Jim and Michelle's roller coaster is a curved pattern that can be represented by a polynomial function.

1. Michelle has a list of possible functions. Pick **one** of the g(x) functions below and then describe to Michelle the key features of g(x), including the end behavior, y-intercept, and zeros.

   a. $g(x) = x^3 - x^2 - 4x + 4$

   b. $g(x) = x^3 + 2x^2 - 9x - 18$

   c. $g(x) = x^3 - 3x^2 - 4x + 12$

   d. $g(x) = x^3 + 2x^2 - 25x - 50$

   e. $g(x) = 2x^3 + 14x^2 - 2x - 14$
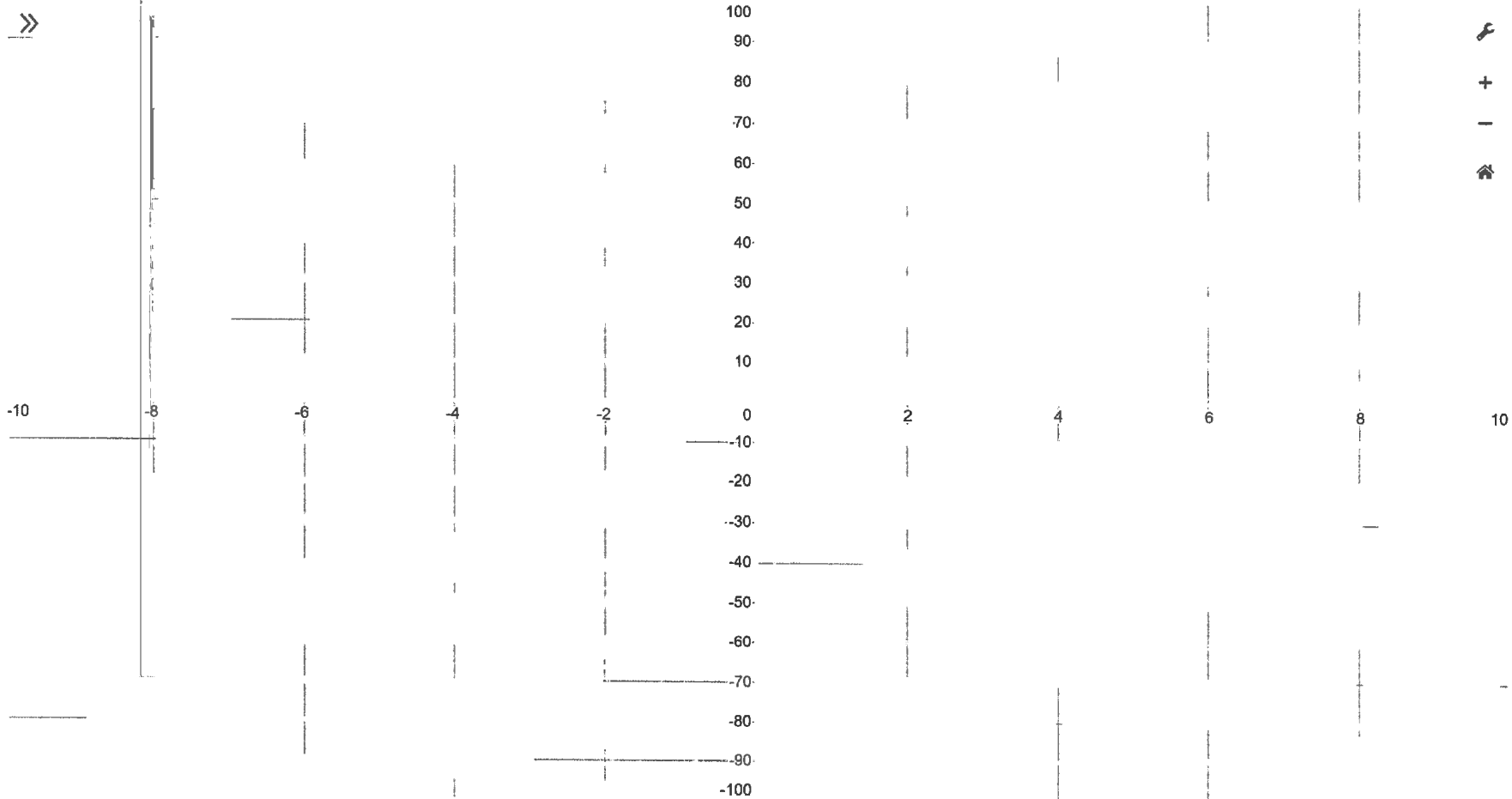
Functions Performance Task
Part A

1. Identify the function you will use: $g(x) =$

- What type of polynomial function is this?

- What is the domain?

- What is the range?

- Describe the end behavior:

- Describe the intervals of increase

- Describe the intervals of decrease

- What are the turning points? Are they relative maximums or relative minimums?

- What are the zeros of the function?
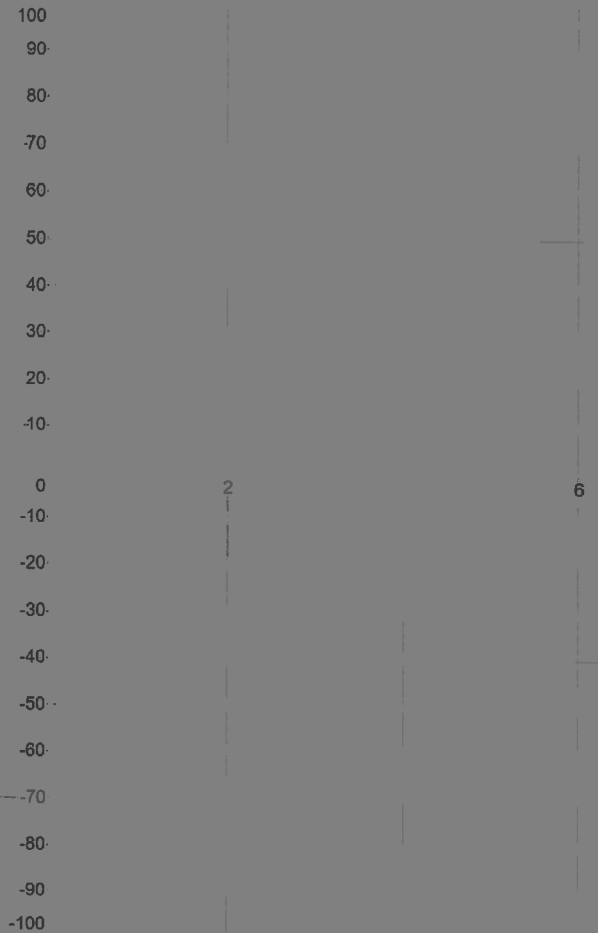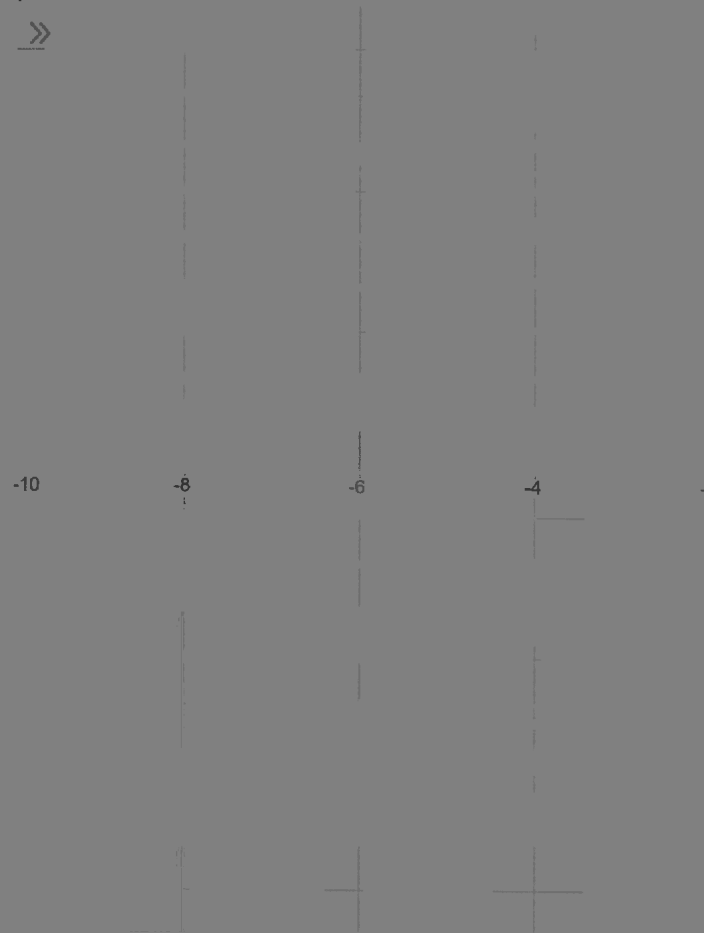
2. Graph the function:

1. Identify the function you will use: $f(x) =$

- What type of polynomial function is this?

- What is the domain?

- What is the range?

- Describe the end behavior:
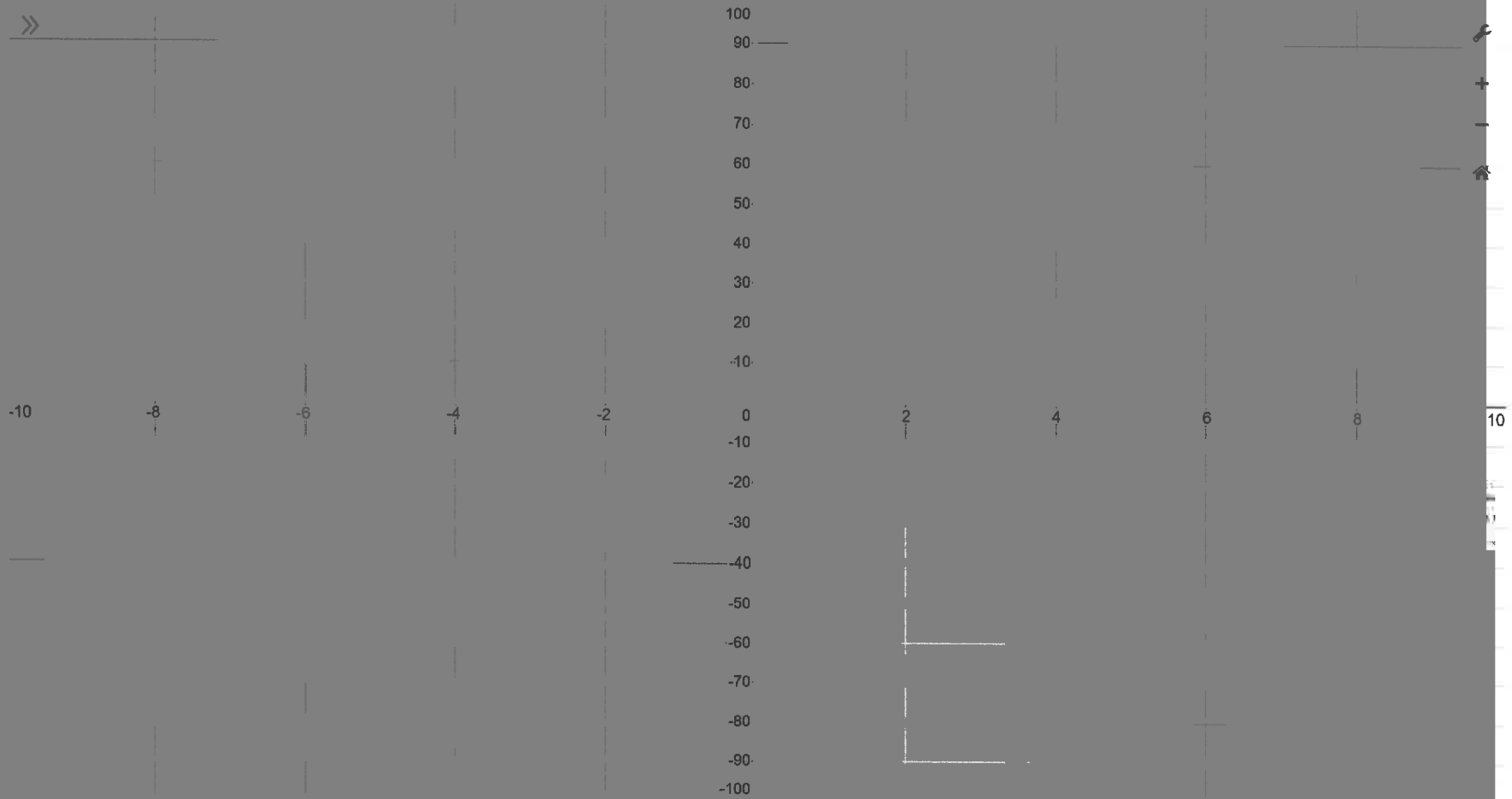
- Describe the intervals of increase

- Describe the intervals of decrease

- What are the turning points? Are they relative maximums or relative minimums?

- What are the zeros of the function?

- What is the equation for the axis of symmetry?

2. Graph the function:

Part C

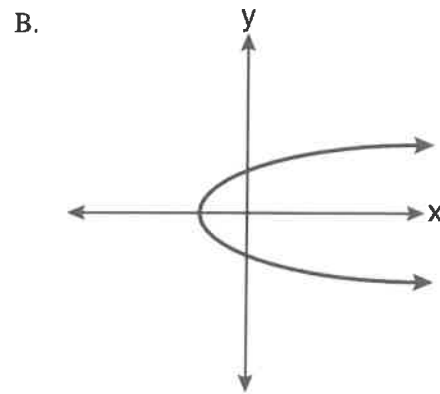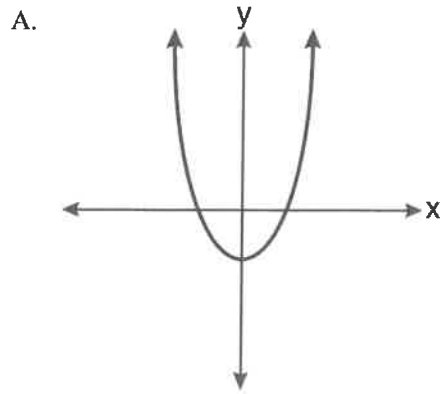1. Graph the entire Roller Coaster. Make sure to label all intercepts & critical points.

2.

				100					
				90 —					
				80					
				70					
				60					
				50					
				40					
				30					
				20					
				-10					
-10	-8	-6	-4	-2	0	2	4	6	8
				-10					
				-20					
				-30					
				-40					
				-50					
				-60					
				-70					
				-80					
				-90					
				-100					

Name: _____   **Date:** _____

1.   Which graph represents a one-to-one function?

A.

B.

C.

D.

7. Which is an equation of the parabola shown in the accompanying diagram?

y

9. Which is the equation of the graph below?

A. $y \quad \log_2 x$

B. $y = -\log_2 x$

C. $y = 2^x$

D. $y = 2^{-x}$

$-2 -1 \quad 1 \ 2 \qquad x$

A. $y = \log x$

B. $y = \log_2 x$

C. $y = 2^x$
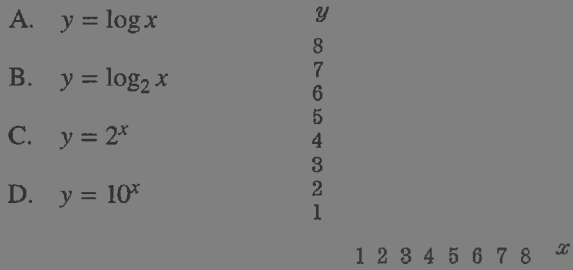
D. $y = 10^x$

y
8
7
6
5
4
3
2
1

1 2 3 4 5 6 7 8 x

8. Which equation represents the parabola shown in the accompanying graph?

A. $f(x) = (x + 1)^2 - 3$

B. $f(x) = -(x - 3)^2 + 1$

C. $f(x) = -(x + 3)^2 + 1$

D. $f(x) = -(x - 3)^2 - 3$

11. Which equation models the data in the accompanying table?

Time in hours, x	0	1	2	3	4	5	6
Population, y	5	10	20	40	80	160	320

A. $y = 2x + 5$

B. $y = 2^x$

C. $y = 2x$

D. $y \quad 5(2^x)$

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12. The height, $f(x)$, of a bouncing ball after x

13. Which equation is represented by the accompanying graph?

y

x

A. $y = 2^x$ B. $y = -2^x$

C. $y = 2^{-x}$ D. $y = x^2 - 2$

14. Which statement about the graph of the equation

15. Solve for the positive value of x: $\log_x 9 = 2$

16. If $\log_9 x = \frac{3}{2}$, what is the value of x?

A. $\frac{3}{2}$ B. 8   C. $\frac{27}{2}$ D. 27

17. If $\log 28 = \log 4 + \log x$, what is the value of x?

A. 7   B. 14   C. 24   D. 32

18. In the equation $\log_x 4 + \log_x 9 = 2$, x is equal to

A. $\sqrt{13}$ B. 6   C. 6.5   D. 18

10. Solve for m: $\log(m+1) = 2$

21. Express $\sqrt{27}$ correct to three decimal places.

A. ~~5.192~~   B. ~~5.196~~   C. ~~5.199~~   D. ~~5.2~~

22. The numbers $\sqrt{7}$ $\quad 12 \quad$ $\sqrt[3]{25}$ arranged in increasing

25. $\sqrt[6]{108}$ is equivalent to:

A. $\sqrt{3}\,\sqrt[3]{2}$ B. $\sqrt[3]{2}\,\sqrt[6]{12}$

A. 4   B. 2

C. $1 + \sqrt{15}$ D. none of these

23. $625^{-3/4} =$

A. -125 B. 0.2 C. 125 D. 0.008

27. If x and $a \neq 0$ are real numbers, $\sqrt{\dfrac{49x^2}{a^4}}$ is equal to:

A. $\dfrac{\pm 7\,|x|}{a^2}$ B. $\dfrac{7x}{a^2}$

C. $\dfrac{7\,|x|}{a^2}$ D. none of these

24. $\left(\dfrac{216}{15625}\right)^{-\frac{2}{3}}$ is equal to:

A. $\dfrac{6}{25}$ B. $\dfrac{125}{6}$ C. $\dfrac{36}{625}$ D. $\dfrac{625}{36}$

28. Simplify: $\sqrt{56x^2y^7} \cdot \sqrt{8xy}$

A. $8xy^4\sqrt{7x}$ B. $7x^2y^4\sqrt{64x}$

C. $8x^3y^7\sqrt{7y}$ D. none of these

29. Simplify: $\dfrac{\sqrt{8}+\sqrt{50}}{\sqrt{2}}$

  A. $\sqrt{29}$ B. 7

  C. $\sqrt{8}+5$ D. none of these

30. $6\sqrt{3}-\sqrt{12}$ can be written as:

  A. $\sqrt{48}$ B. $20\sqrt{0.12}$

  C. all of these   D. none of these

31. ~~illegible~~ $\left(2-\sqrt[4]{25}\right)\left(2+\sqrt[4]{25}\right)$

  A. 4   B. 8   C. -16

  D. none of these

32. The value of $(2-\sqrt[4]{9})(2+\sqrt[4]{9})$ is:

  A. 1   B. 9   C. -5

  D. none of these

33. Simplify $(\sqrt{x}-\sqrt{3})(\sqrt{x}+\sqrt{3})-(\sqrt{x}-\sqrt{2})^2$

  A. -1 B. $\sqrt{2x-5}$

  C. $2\sqrt{2x}-5$ D. $2x+2\sqrt{2x}-5$

34. If $3+\sqrt{3}$ is divided by $2+\sqrt{3}$, the result is:

  A. $3-\sqrt{3}$ B. $3+\sqrt{3}$ C. $\sqrt{3}-3$

  D. none of these

35. The sum of $\dfrac{3}{2-\sqrt{2}}$ and $\dfrac{3}{2+\sqrt{2}}$ is:

  A. 1.5   B. 6   C. $\frac{3}{4}$

  D. none of these

36. The sum of $\dfrac{5}{3+\sqrt{3}}$ and $\dfrac{5}{3-\sqrt{3}}$ is:

  A. $\frac{10}{6}$ B. 5   C. $-10\frac{3}{6}$

  D. none of these

37. The number of real solutions of the equation $(\sqrt{3x-2} + \sqrt{2x-3}) = 1$ is:

   A. 0   B. 2   C. 3   D. 4

38. Find the sum of the solutions for the following equation:

$$x + \sqrt{x+5} = 7$$

   A. 15   B. 0

   C. 4   D. no solution

39. What is the sum of the solutions of:

$$\sqrt{1-x} = x+5$$

   A. −11   B. 11   C. −3   D. −4

40. Find the solution set of the real numbers for the radical equation $\sqrt{2x+1} = 1 + \sqrt{x}$.

   A. ∅   B. $\{0, -4\}$ C. $\{0, 4\}$

   D. none of these