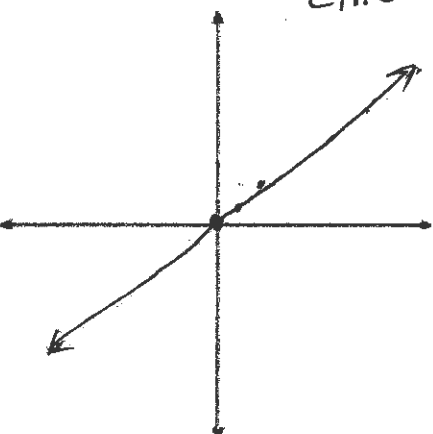
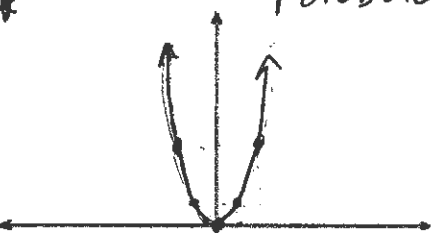
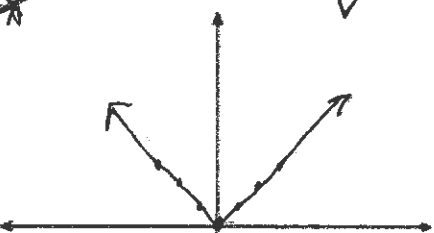


Distance Learning: Key Features of Functions Review (Section 1-1)

Term	Definition
* Domain	All of the inputs (x-values) that produce a real number output (y-value) for a function.
* Range	All of the outputs (y-values) for a function.
* Interval Notation	A notation to describe a large set of numbers. $(3, 7]$ → all numbers greater than 3 but less than or equal to 7. $(-2, 5)$ → all numbers greater than -2 but less than 5.

Linear Parent Function	Quadratic Parent Function	Absolute Value Parent Function
$y = x$ "Line"  y-int: $(0, 0)$ slope = 1	$y = x^2$ "Parabola"  Vertex $(0, 0)$	$y = x $ "V"  Vertex $(0, 0)$ slope = ± 1
Key Features: Domain: $(-\infty, \infty)$ Range: $(-\infty, \infty)$ X-intercept(s): $(0, 0)$ Y-intercept: $(0, 0)$ Increasing: $(-\infty, \infty)$ Decreasing: none Positive: $(0, \infty)$ Negative: $(-\infty, 0)$	Key Features: * Domain: $(-\infty, \infty)$ Range: $[0, \infty)$ X-intercept(s): $(0, 0)$ Y-intercept: $(0, 0)$ Increasing: $[0, \infty)$ Decreasing: $(-\infty, 0]$ Positive: $(-\infty, 0) + (0, \infty)$ Negative: none	Key Features: Domain: $(-\infty, \infty)$ Range: $[0, \infty)$ X-intercept(s): $(0, 0)$ Y-intercept: $(0, 0)$ Increasing: $[0, \infty)$ Decreasing: $(-\infty, 0]$ Positive: $(-\infty, 0) + (0, \infty)$ Negative: none

y's ←

Increasing: the interval where the function rises from left → right
 Decreasing: the interval where the function goes down from left to right
 Positive: the interval where the function is above the x-axis
 Negative: the interval where the function is below the x-axis.

MASTER

Examples: For each equation, graph the function and give the key features.

1. $y = x^2 - 4$

Use interval notation

Parabola
4 Down

- ① Start at vertex
- ② Move 1 right and 1² up
- ③ Start at vertex
- ④ Move 2 right and 2² up
- ⑤ Use symmetry

Domain	$(-\infty, \infty)$
Range	$[-4, \infty)$
X-intercept	$(-2, 0) + (2, 0)$
Y-intercept	$(0, -4)$
Increasing	$[0, \infty)$
Decreasing	$(-\infty, 0]$
Positive	$(-\infty, -2) + (2, \infty)$
Negative	$(-2, 2)$

2. $y = |x| + 2$

V
2 UP
slope = ± 1

Domain	$(-\infty, \infty)$
Range	$[2, \infty)$
X-intercept	none
Y-intercept	$(0, 2)$
Increasing	$[0, \infty)$
Decreasing	$(-\infty, 0]$
Positive	$(-\infty, \infty)$
Negative	none

3. $y = -x^2$

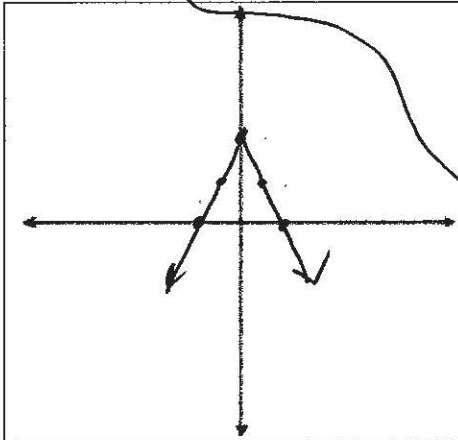
Parabola
Opens Down
Vertex $(0, 0)$

- ① Start at vertex
- ② Move 1 right and 1² down

Domain	$(-\infty, \infty)$
Range	$(-\infty, 0]$
X-intercept	$(0, 0)$
Y-intercept	$(0, 0)$
Increasing	$(-\infty, 0]$
Decreasing	$[0, \infty)$
Positive	none
Negative	$(-\infty, 0) + (0, \infty)$

When $x=0 \rightarrow y=0$
so it is not
positive/negative
at $x=0$.

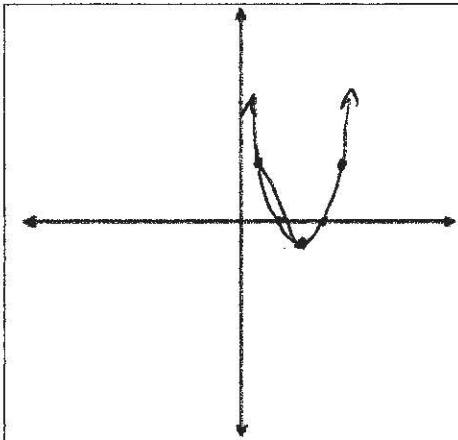
4. $y = -2|x| + 4$



"V"
4 up (opens down)
Slope = -2

Domain	$(-\infty, \infty)$
Range	$(-\infty, 4]$
X-intercept	$(-2, 0) + (2, 0)$
Y-intercept	$(0, 4)$
Increasing	$(-\infty, 0]$
Decreasing	$[0, \infty)$
Positive	$(-2, 2)$
Negative	$(-\infty, -2) + (2, \infty)$

5. $y = (x - 3)^2 - 1$

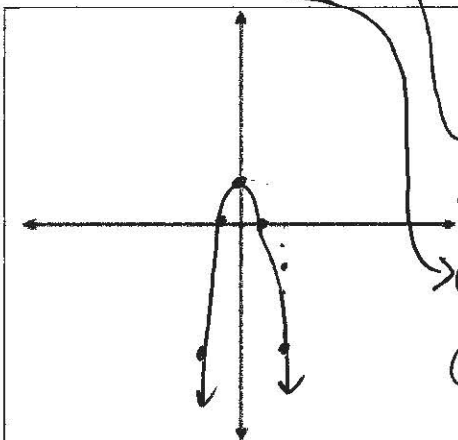


Parabola
3 right, 1 down

Domain	$(-\infty, \infty)$
Range	$[-1, \infty)$
X-intercept	$(2, 0) + (4, 0)$
Y-intercept	$(0, 8)$
Increasing	$[3, \infty)$
Decreasing	$(-\infty, 3]$
Positive	$(-\infty, 2) + (4, \infty)$
Negative	$(2, 4)$

$y = (0 - 3)^2 - 1$
 $y = (-3)^2 - 1$
 $y = 9 - 1 = 8$

6. $y = -2x^2 + 2$



Parabola
2 up
opens Down
 ① Start at vertex
 ② Move 1 right and $2(1)^2$ down
 ③ Move 2 right and $2(2)^2$ down

Domain	$(-\infty, \infty)$
Range	$(-\infty, 2]$
X-intercept	$(-1, 0) + (1, 0)$
Y-intercept	$(0, 2)$
Increasing	$(-\infty, 0]$
Decreasing	$[0, \infty)$
Positive	$(-1, 1)$
Negative	$(-\infty, -1) + (1, \infty)$