Math Studies Name Solutions ID: 1

Function Review 2

Without graphing, identify the vertex, axis of symmetry, direction of opening, and min/max value of each. $y = a(x-h)^2 + k$ vertex (h,k) axis: $x = h$ or $x = \frac{-b}{2a}$

1) $y = (x+2)^2 - 6$
V(−2, −6) a = 1 : opens ↑
axis: x = −2 min at −6

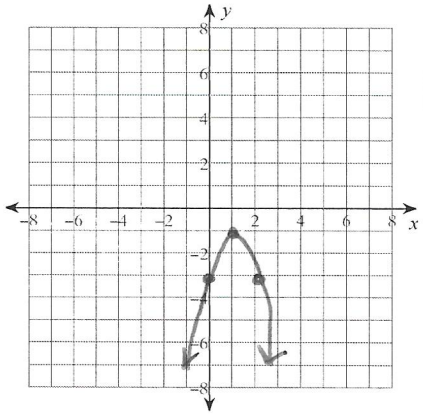
2) $y = -6(x-7)^2 - 8$
V(7, −8) a = −6 : opens ↓
axis: x = 7 max at −8

3) $y = 5x^2 + 50x + 131$
$x = \frac{-50}{2(5)} = -5$ f(−5) = 6
V(−5, 6) a = 5 : opens ↑ min at 6

4) $y = -x^2 + 10x - 33$
$x = \frac{-10}{2(-1)} = 5$ f(5) = −8
V(5, −8) a = −1 : opens ↓ max at −8

Identify the vertex, axis of symmetry, y-intercept, and x-intercepts of each. Then sketch the graph.

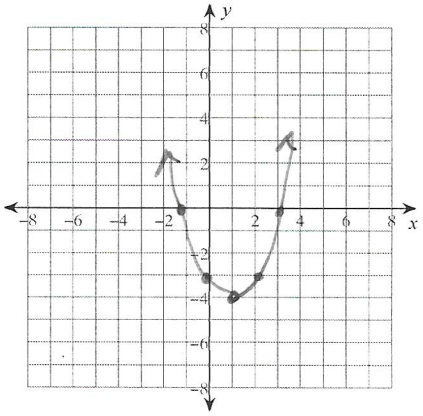
5) $y = -2(x-1)^2 - 1$
V(1, −1)
axis: x = 1



y-int:
$y = -2(0-1)^2 - 1$
y = −3

x-int: none

6) $y = x^2 - 2x - 3$
$x = \frac{-(-2)}{2(1)} = \frac{2}{2} = 1$



f(1) = −4
V(1, −4)

y-int:
$y = 0 - 2(0) - 3$
y = −3

x-int:
$0 = x^2 - 2x - 3$
$0 = (x-3)(x+1)$
x = 3, −1

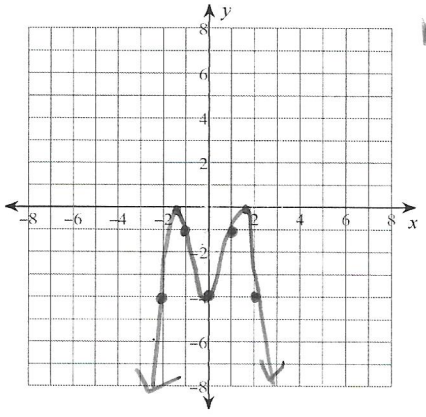
Describe the end behavior of each function.

7) $f(x) = -x^4 - 2x^2 - x + 2$
even degree coeff is pos
↖ ↗ both ends up

8) $f(x) = -x^3 + 3x^2 + 3$
odd degree coeff is neg.
↖ ↘ left up, right down

Sketch the graph of each function. State the minimums, maximums, and zeros (if any).

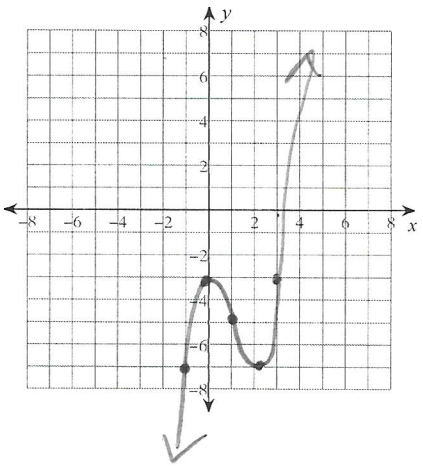
9) $f(x) = -x^4 + 4x^2 - 4$



max:
(−1.41, 0)
(1.41, 0)
min (0, −4)

zeros:
−1.41, 1.41

10) $f(x) = x^3 - 3x^2 - 3$



max (0, −3)

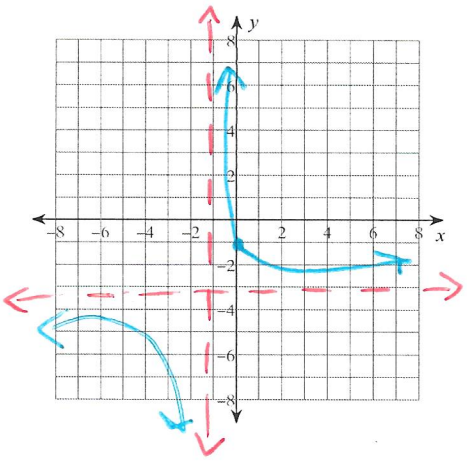
min (2, −7)

zeros:
3.28

use calc (2nd trace) to find min, max, & zeros

For each function, identify the horizontal and vertical asymptotes. Then sketch the graph.

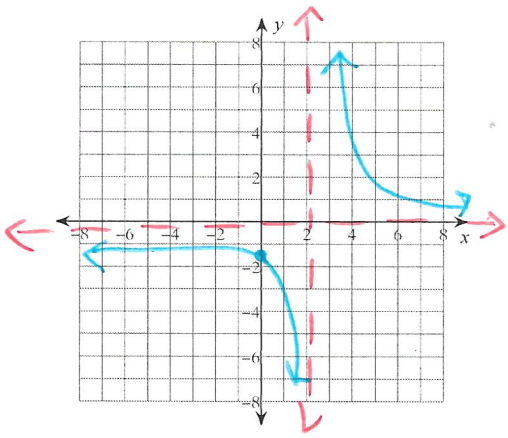
11) $f(x) = \dfrac{2}{x+1} - 3$



hor: $y = -3$

ver: $x = -1$

12) $f(x) = \dfrac{3}{x-2}$



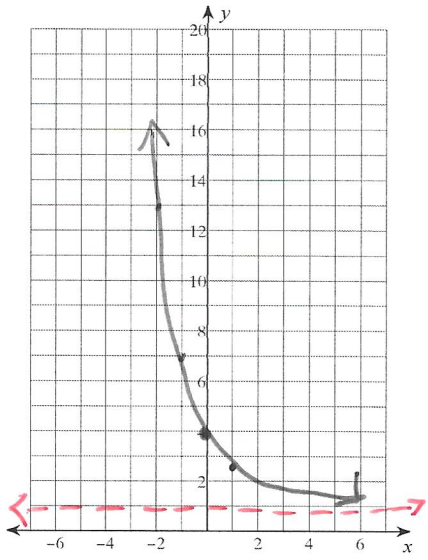
hor: $y = 0$

ver: $x = 2$

State whether the function is growth or decay. Sketch the graph of each function. Then find the y-intercept and state the horizontal asymptote.

$y = a \cdot b^x$

13) $y = 3 \cdot \left(\dfrac{1}{2}\right)^x + 1$



$b = \frac{1}{2}$

decay

y-int

$y = 3 \cdot \left(\frac{1}{2}\right)^0 + 1$

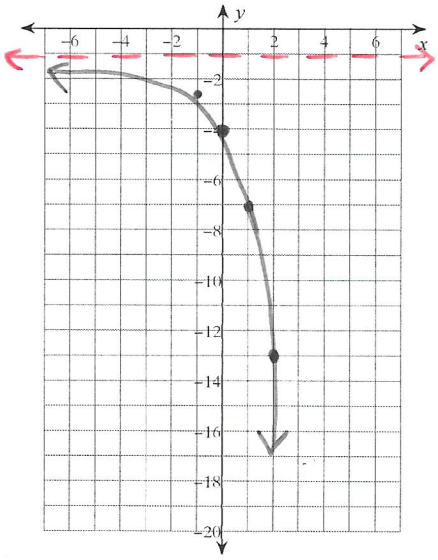
$y = 3(1) + 1$

$y = 4$

hor. asym

$y = 1$

14) $y = -3 \cdot 2^x - 1$



$b = 2$

growth

y-int

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

$y = -3(1) - 1$

$y = -4$

hor asym

$y = -1$