Positive odd

Negative odd

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Date ____________________

Algebra II

Sketching Polynomial Functions

1. $f(x) = x^3 + 2x^2 - 9x - 18$

Shape: positive odd

y-intercept:
-18

x-intercepts (zeros):
{-3,-2,3}

End Behavior: down

left

$x \to -\infty,\ f(x) \to -\infty$

$x \to \infty,\ f(x) \to \infty$

right up

increasing

$(-\infty, -2.5)$ $(.5, \infty)$

decreasing

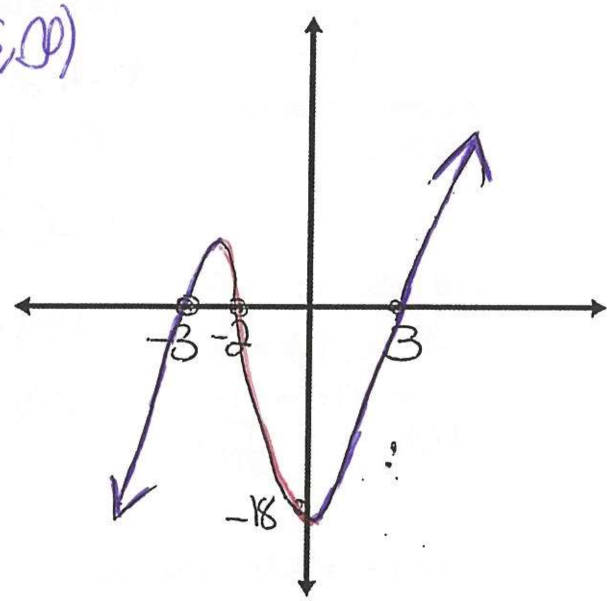
$(-2.5, .5)$

positive

$(-3, -2)$ $(3, \infty)$

negative

$(-2, 3)$



2. $f(x) = x^4 - 10x^2 + 9$

Shape:

positive even

y-intercept: 9

x-intercepts (zeros):
{-3,-1,1,3}

End Behavior: up

left

$x \to -\infty,\ f(x) \to \infty$

$x \to \infty,\ f(x) \to \infty$

right up

increasing

$(-2, 0)$ $(2, \infty)$

decreasing

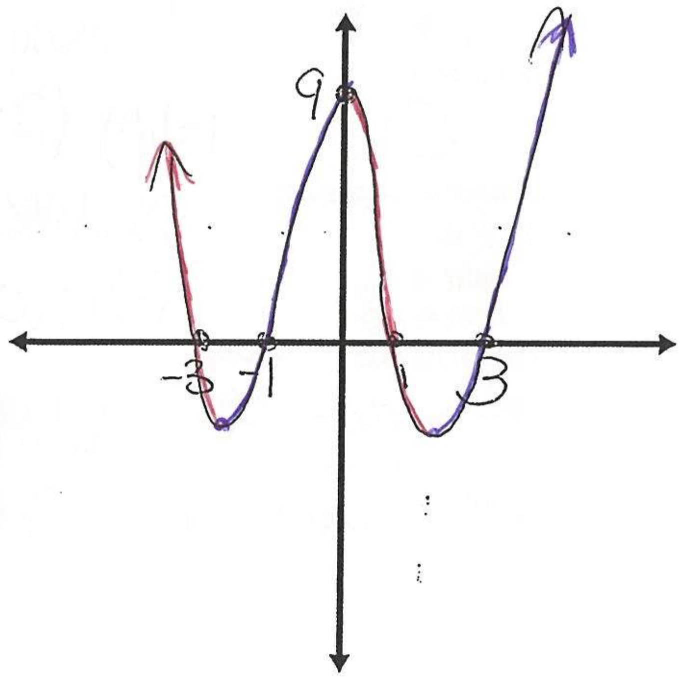
$(-\infty, -2)$ $(0, 2)$

positive

$(-\infty, -3)$ $(-1, 1)$ $(3, \infty)$

negative

$(-3, -1)$ $(1, 3)$



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

Shape: negative odd

increasing

$(-2.5, 0)$

y-intercept:

12

decreasing

$(-\infty, -2.5)$ $(0, \infty)$

x-intercepts (zeros):
$\{-3, -2, 2\}$

Positive

$(-\infty, -3)$ $(-2, 2)$

End Behavior:

left, up

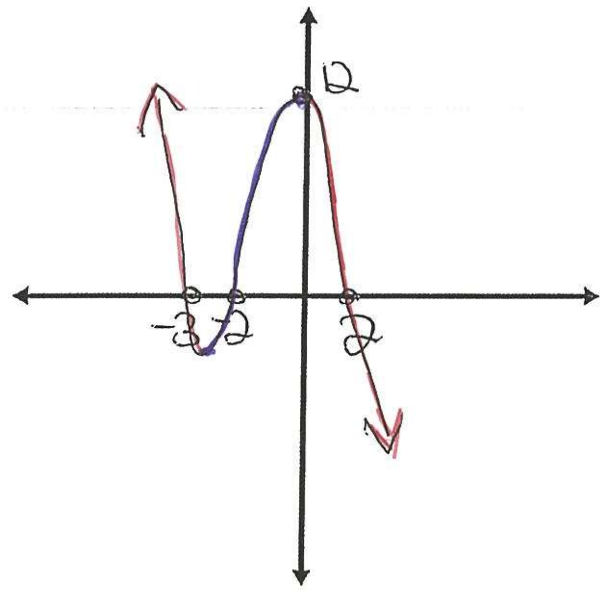
$x \to -\infty,\ f(x) \to \infty$

$x \to \infty,\ f(x) \to -\infty$

right, down

negative

$(-3, -2)$ $(2, \infty)$



4. $f(x) = -x^4 + 3x^3 + 10x^2 + 0$

Shape:

negative even

increasing

$(-\infty, -1)$ $(0, 2.5)$

decreasing

y-intercept:

0

$(-1, 0)$ $(2.5, \infty)$

x-intercepts (zeros):
$\{-2, 0, 0, 5\}$

double root
bounces off

Positive

$(-2, 0)$ $(0, 5)$

End Behavior:

left, down

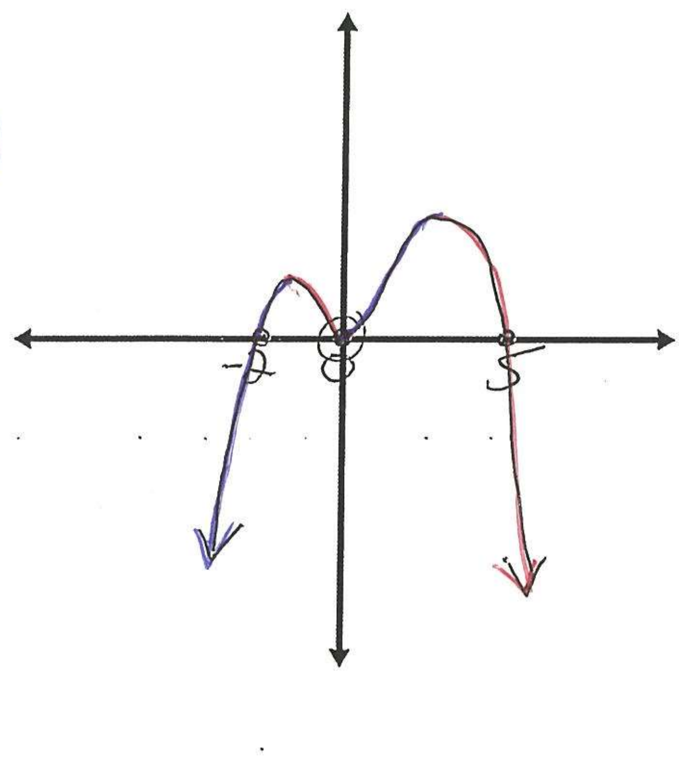
$x \to -\infty,\ f(x) \to -\infty$

$x \to \infty,\ f(x) \to -\infty$

right, down

negative

$(-\infty, -2)$ $(5, \infty)$



5. $p(x) = x^3 - 3x^2 - 9x + 27$

Shape: positive odd

increasing
$(-\infty, 0)$ $(3, \infty)$

y-intercept:
27

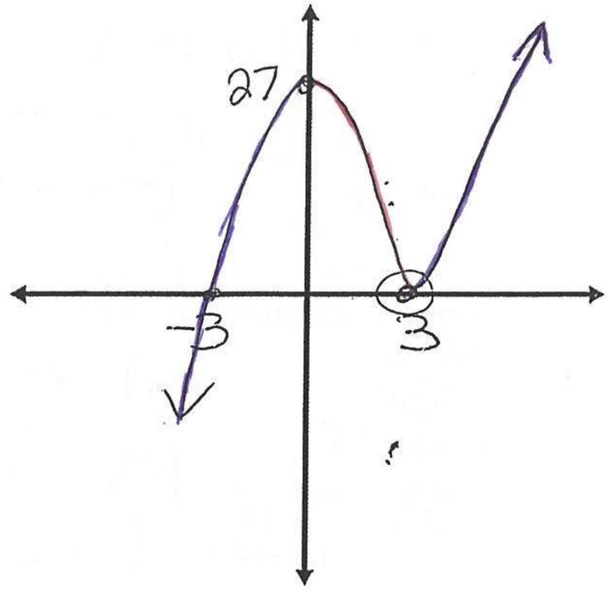
decreasing
$(0, 3)$

x-intercepts (zeros):
$\{-3, 3, 3\}$
double root
bounces off

positive
$(-3, 3)$ $(3, \infty)$

End Behavior:
left $x \to -\infty$, $f(x) \to -\infty$ down
$x \to \infty$, $f(x) \to \infty$
right up

negative
$(-\infty, -3)$



6. $h(x) = x^6 - 5x^4 + 4x^2$

Shape:
Positive even

increasing
$(0, .5)$ $(2.5, \infty)$

decreasing
$(-\infty, 0)$ $(.5, 2.5)$

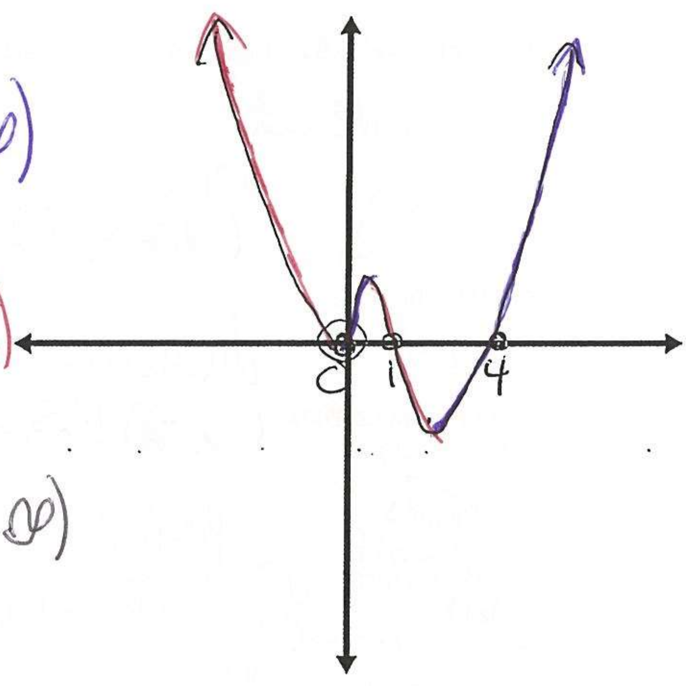
y-intercept:
0

x-intercepts (zeros):
$\{0, 0, 1, 4\}$
double root
bounces off

positive
$(-\infty, 0)$ $(0, 1)$ $(4, \infty)$

End Behavior:
left $x \to -\infty$, $f(x) \to \infty$ up
$x \to \infty$, $f(x) \to \infty$
right up

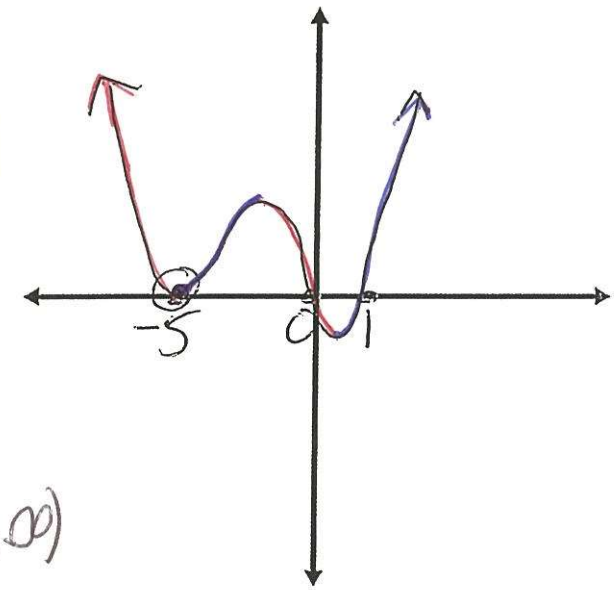
negative
$(1, 4)$



7. $f(x) = x^4 + 11x^3 + 15x^2 - 25x$

Shape: positive even

increasing
$(-5, -2.5)$ $(.5, \infty)$



y-intercept:

0

x-intercepts (zeros): $\{-5, -5, 0, 1\}$

double root
bounces off

decreasing
$(-\infty, -5)$ $(-2.5, .5)$

positive
$(-\infty, -5)$ $(-5, 0)$ $(1, \infty)$

End Behavior:

left $x \to -\infty$, $f(x) \to \infty$ up

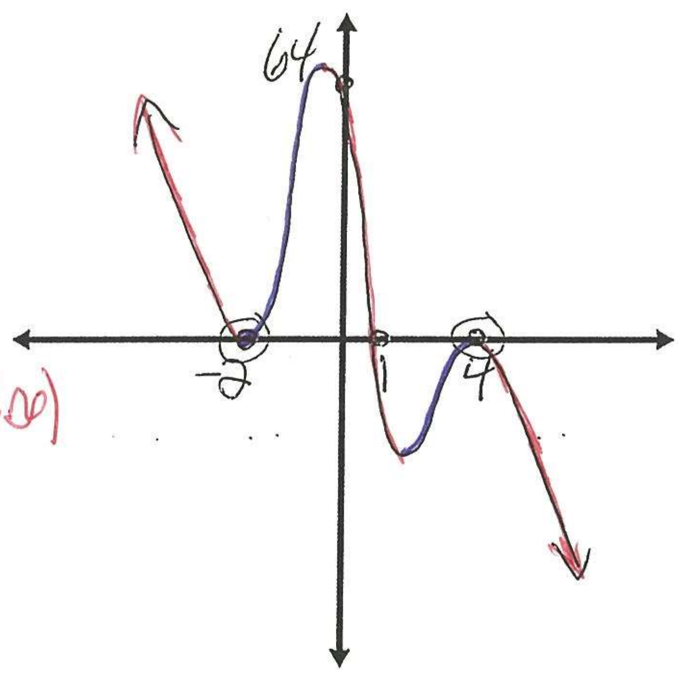
right $x \to \infty$, $f(x) \to \infty$ up

negative
$(0, 1)$

8. $g(x) = -x^5 + 5x^4 + 8x^3 - 44x^2 - 32x + 64$

Shape: negative odd

increasing
$(-2, -.5)$ $(2.5, 4)$



y-intercept:

64

decreasing
$(-\infty, -2)$ $(-.5, 2.5)$ $(4, \infty)$

x-intercepts (zeros): $\{-2, -2, 1, 4, 4\}$

double roots
bounce off

positive
$(-\infty, -2)$ $(-2, 1)$

End Behavior:

left $x \to -\infty$, $f(x) \to \infty$ up

right $x \to \infty$, $f(x) \to -\infty$ down

negative
$(1, 4)$ $(4, \infty)$

9. $f(x) = -2x^4 - 2x^3 + 34x^2 + 42x - 72$

Shape: negative even

y-intercept:

-72

x-intercepts (zeros):
$\{-3, -3, 1, 4\}$
double root
bounces off

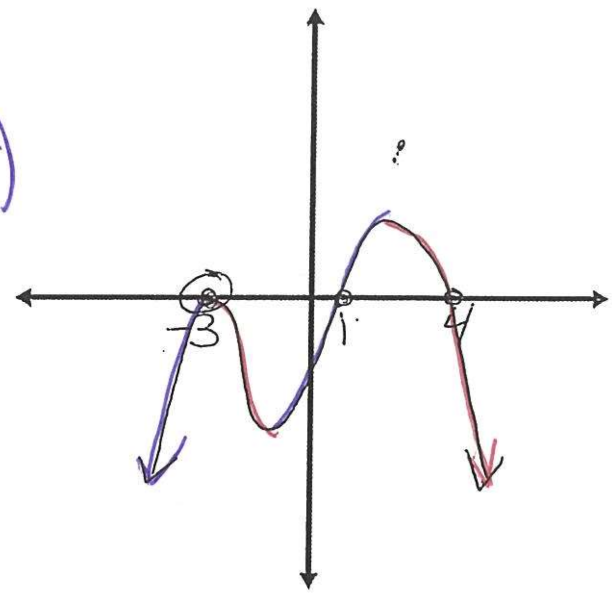
End Behavior:
left down
$x \to -\infty$, $f(x) \to -\infty$
$x \to \infty$, $f(x) \to -\infty$
right down

increasing
$(-\infty, -3)$ $(-1, 2.5)$

decreasing
$(-3, -1)$ $(2.5, \infty)$

positive
$(1, 4)$

negative
$(-\infty, -3)$ $(-3, 1)$ $(4, \infty)$



10. $g(x) = -x^4 + 2x^3 + 4x^2 - 8x$

Shape:
negative even

y-intercept:

0

x-intercepts (zeros):
$\{-2, 0, 2, 2\}$
double root
bounces off

End Behavior:
left down
$x \to -\infty$, $f(x) \to -\infty$
$x \to \infty$, $f(x) \to -\infty$
right down

increasing
$(-\infty, -1)$ $(1, 2)$

decreasing
$(-1, 1)$ $(2, \infty)$

positive
$(-2, 0)$

negative
$(-\infty, -2)$ $(0, 2)$ $(2, \infty)$