

Name Key

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

Zeros @: $x = -4$ + $x = -2$

Multiplicity: (2) even
 ↓
 bounce

(2) even
 ↓
 bounce

Degree: 4 → even

Leading coefficient: 1 → positive

End Behavior

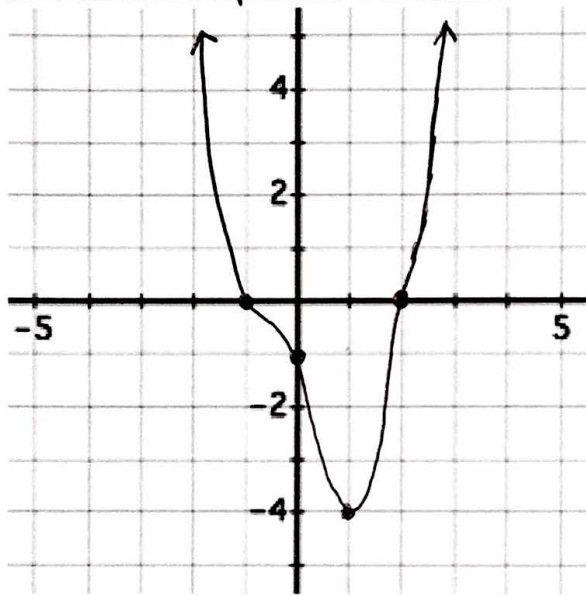
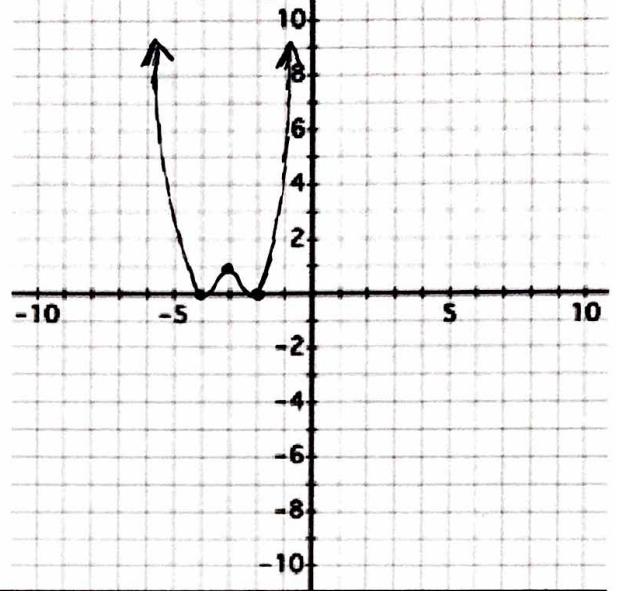
$x \rightarrow -\infty, y \rightarrow +\infty$

$x \rightarrow +\infty, y \rightarrow +\infty$

Test point: $f(-3) = 1$



Graphing Polynomials by Hand



2) $f(x) = \frac{1}{2}(x + 1)^3(x - 2)$

Zeros @: $x = -1$ + $x = 2$

Multiplicity: (3) odd
 ↓
 passes over

(1) odd
 ↓
 passes over

Degree: 4 → even

L. coefficient: $\frac{1}{2}$ → positive

$x \rightarrow -\infty, y \rightarrow +\infty$

$x \rightarrow +\infty, y \rightarrow +\infty$

Test points: $f(0) = -1$ + $f(1) = -4$



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

Zeros @: $x = 0$ + $x = 4$

Multiplicity: (1) odd
 ↓
 pass over

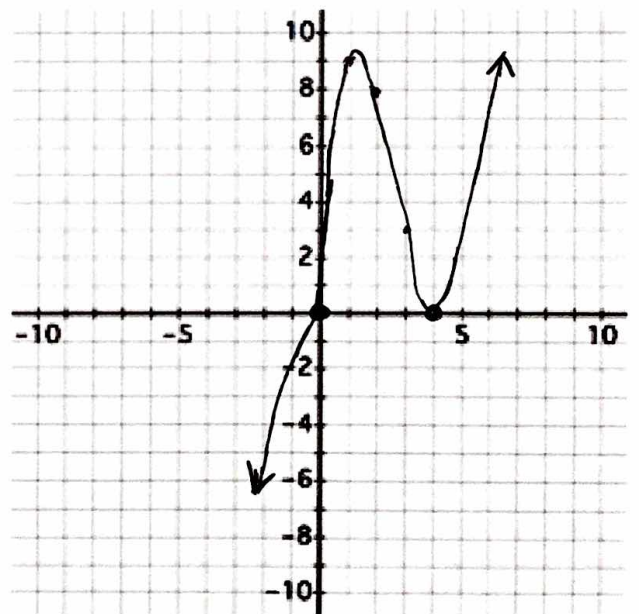
(2) even
 ↓
 bounce

Degree: 3 odd Leading coefficient: 1 positive

$x \rightarrow -\infty, y \rightarrow -\infty$

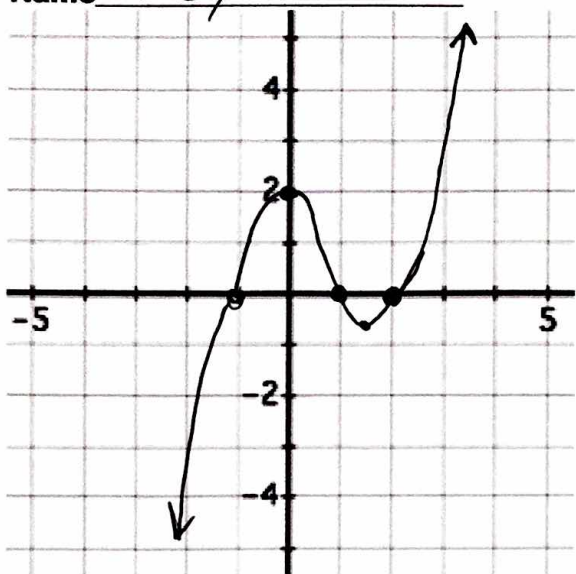
$x \rightarrow +\infty, y \rightarrow +\infty$

Test points: $f(2) = 8$



Name Key

Graphing Polynomials by Hand



4) $f(x) = (x - 2)(x - 1)(x + 1)$

zeros @: $x = 2, x = 1, \text{ \& } x = -1$
 multiplicity: $(1), (1), \text{ \& } (1)$
 odd, odd, odd
 ↓ ↓ ↓
 pass over, pass over, pass over

Degree: 3
odd

Leading coefficient: 1
positive

$x \rightarrow -\infty, y \rightarrow -\infty$
 $x \rightarrow +\infty, y \rightarrow +\infty$

Test points: $f(0) = 2$
 $f(1.5) = 0.625$

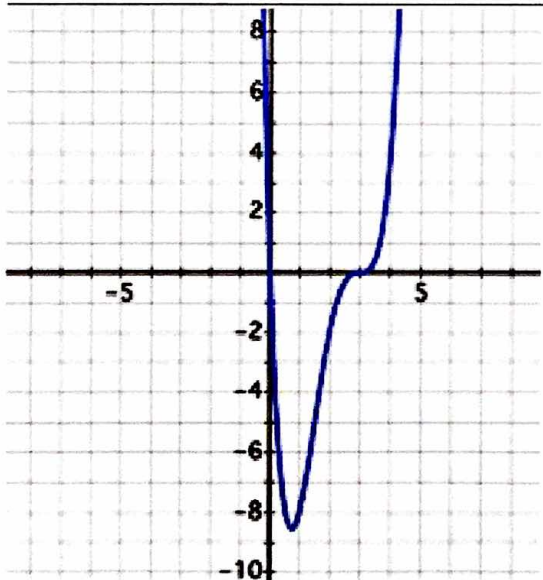
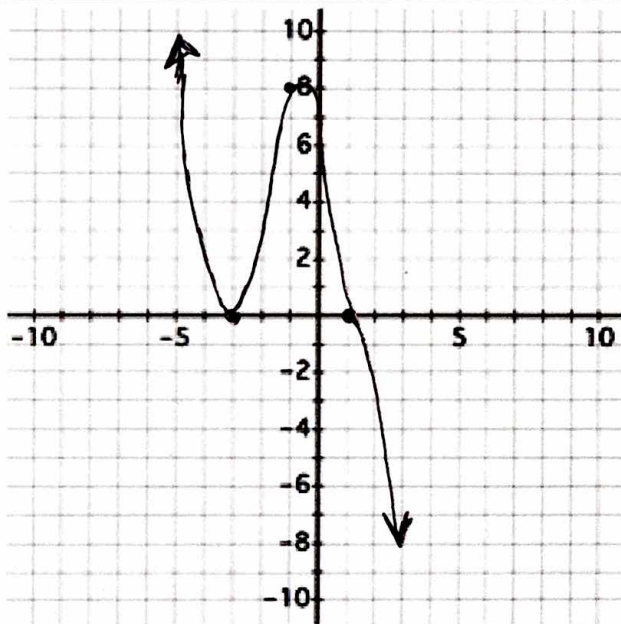
5) $f(x) = -\frac{1}{4}(x + 3)^2(x - 1)^3$

zeros @: $x = -3 \text{ \& } x = 1$
 multiplicity: $(2), (3)$
 even, odd
 ↓ ↓
 bounce, pass over

Degree: 5 → odd
 L. coefficient: $-\frac{1}{4}$ → negative

$x \rightarrow -\infty, y \rightarrow +\infty$
 $x \rightarrow +\infty, y \rightarrow -\infty$

Test point: $f(-1) = 8$



6) Write a function that would be reasonable for this graph. You do NOT need to put in standard form.

zeros @ $x = 0 \text{ \& } x = 3$
 Multiplicity: $\text{pass over}, \text{pass over}$
 odd, odd

end behavior
 $x \rightarrow -\infty, y \rightarrow +\infty$
 $x \rightarrow +\infty, y \rightarrow +\infty$

Degree must be even
 L. coefficient must be positive

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