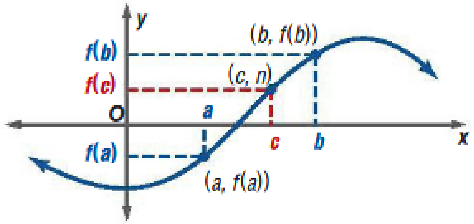
1.3 Continuity, End Behavior, and Limits (day 2)

KeyConcept Intermediate Value Theorem

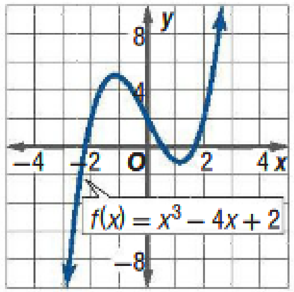
If $f(x)$ is a continuous function and $a < b$ and there is a value n such that n is between $f(a)$ and $f(b)$, then there is a number c, such that $a < c < b$ and $f(c) = n$.



Corollary: The Location Principle If $f(x)$ is a continuous function and $f(a)$ and $f(b)$ have opposite signs, then there exists at least one value c, such that $a < c < b$ and $f(c) = 0$. That is, there is a zero between a and b.

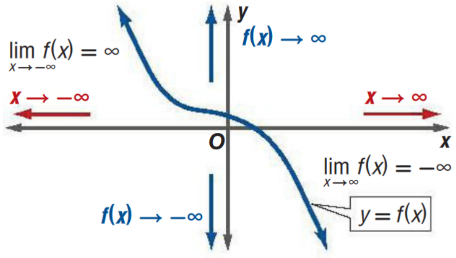
Determine between which consecutive integers the real zeros of each function are located on the given interval.

ex. 1 $f(x) = x^3 - 4x + 2; [-4,4]$



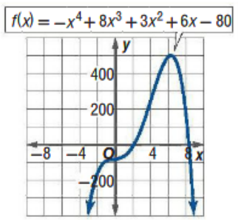
ex. 2 $f(x) = \dfrac{x^2 - 6}{x + 4}; [-3,4]$

2 End Behavior The end behavior of a function describes how a function *behaves* at either *end* of the graph. That is, end behavior is what happens to the value of $f(x)$ as x increases or decreases without bound—becoming greater and greater or more and more negative. To describe the end behavior of a graph, you can use the concept of a limit.

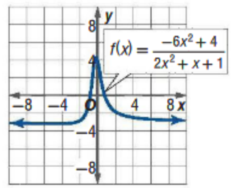


Describe the end behavior for each function (using the graph):

ex. 1 $f(x) = -x^4 + 8x^3 + 3x^2 + 6x - 80$



ex. 2 $f(x) = \dfrac{-6x^2 + 4}{2x^2 + x + 1}$



Use logical reasoning to determine the end behavior or limit of the function as *x* approaches infinity:

(without a graph)

ex. 1 $f(x) = \dfrac{0.8}{x^2}$

ex. 2 $m(x) = \dfrac{4 + x}{2x + 6}$

ex. 3 $k(x) = \frac{4x^2 - 3x - 1}{11x}$

ex. 4 $g(x) = x^4 - 9x^2 + \frac{x}{4}$

Assignment:

Pg. 30 (13-29, 33-39) odd only