Today...

- Finish up “cell size” discussion.
- Even and odd functions, domain of a function.
- Hill functions:
  - Saturating functions (asymptotes),
  - Shape of graph,
  - Shape near origin.
- Reminder: OSH 1 due Monday!
- Reminder: WeBWorK 1 due Thursday!

Limit on cell size

- When is absorption > consumption?

stretch r^2 vertically

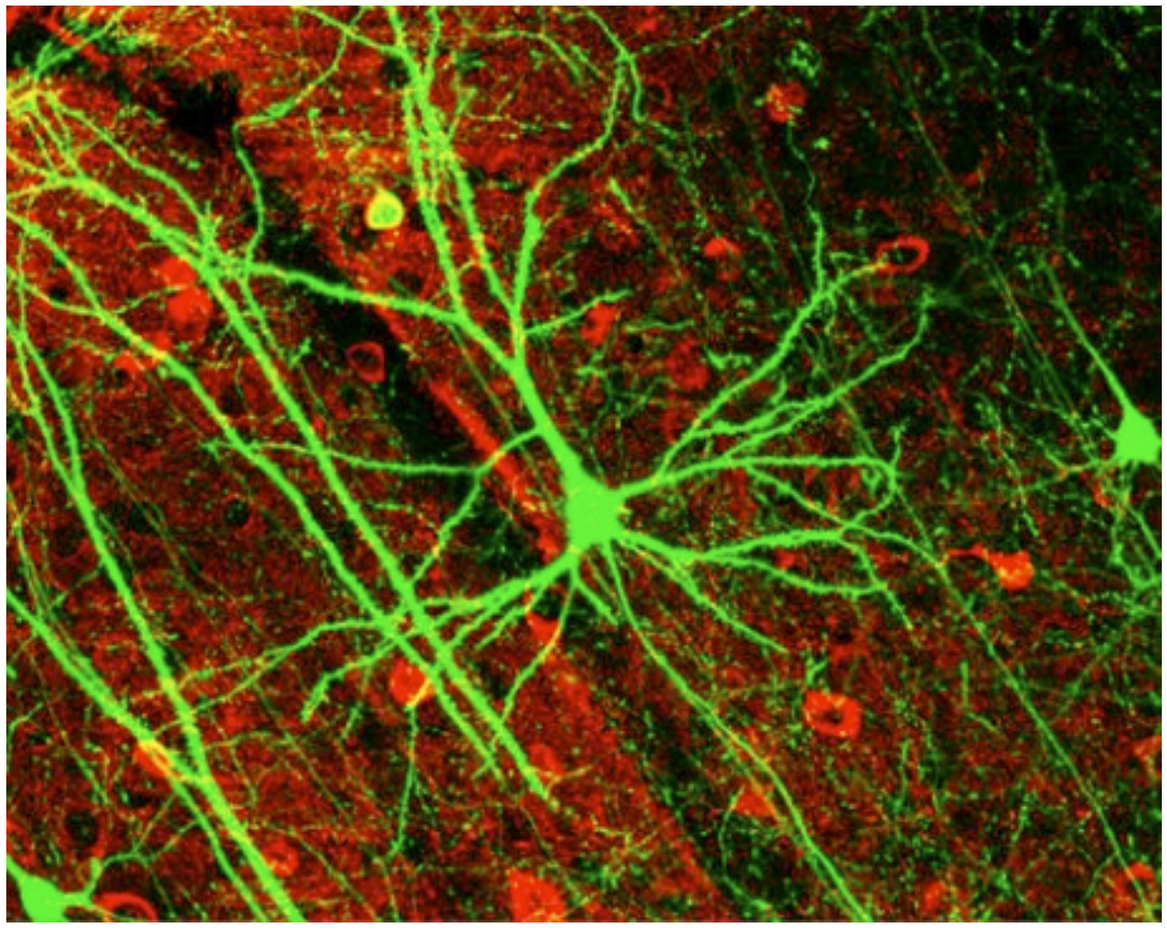
stretch r^3 vertically

$$A = 4k_1\pi r^2 > \frac{4}{3}k_2\pi r^3 = C$$

- Solve for r in terms of other parameters:

$$r < 3\frac{k_1}{k_2}.$$

The “biggest” cells around



Neuron (1 meter)

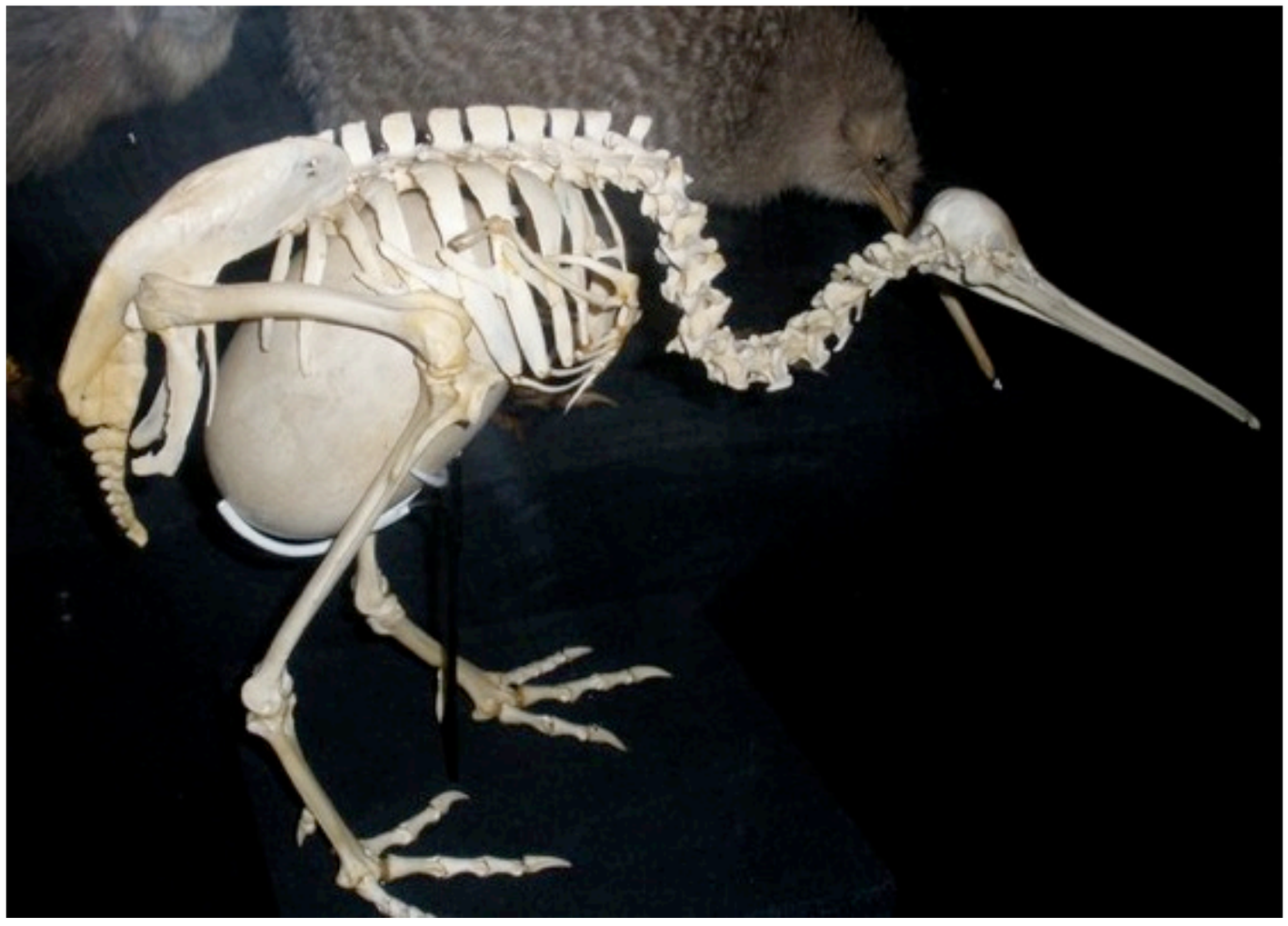
The “biggest” cells around

Caulerpa prolifera (single cell, 1 meter)

Getting around S:V issues

- Don’t be spherical if you want to be big.

“Eggceptions”



Kiwi egg (not the biggest but remarkable)

“Eggceptions”

Ostrich egg

Bad examples in this context - why?

Even and odd functions

- A function f is called even if f(-x)=f(x) for all values of x.
- A function f is called odd if f(-x)=-f(x) for all values of x.
- For power functions, even/odd-ness of the function is the same as even/odd-ness of the power.
- What about for polynomials?

Which function is odd?

(A) $f(x) = 2$

(B) $g(x) = x^2 - 3x^4$

(C) $h(x) = x + x^2$

(D) $k(x) = 3x+x^5$

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Even or odd? $f(x) = \dfrac{x^n}{a^n + x^n}$.

(A) f(x) is even when n is even and f(x) is odd when n is odd.

(B) f(x) is even when n is odd and f(x) is odd when n is even.

(C) f(x) is even when n is even and f(x) is neither even nor odd when n is odd.

(D) f(x) is even for all values of n.

(E) f(x) is neither even nor odd for any value of n

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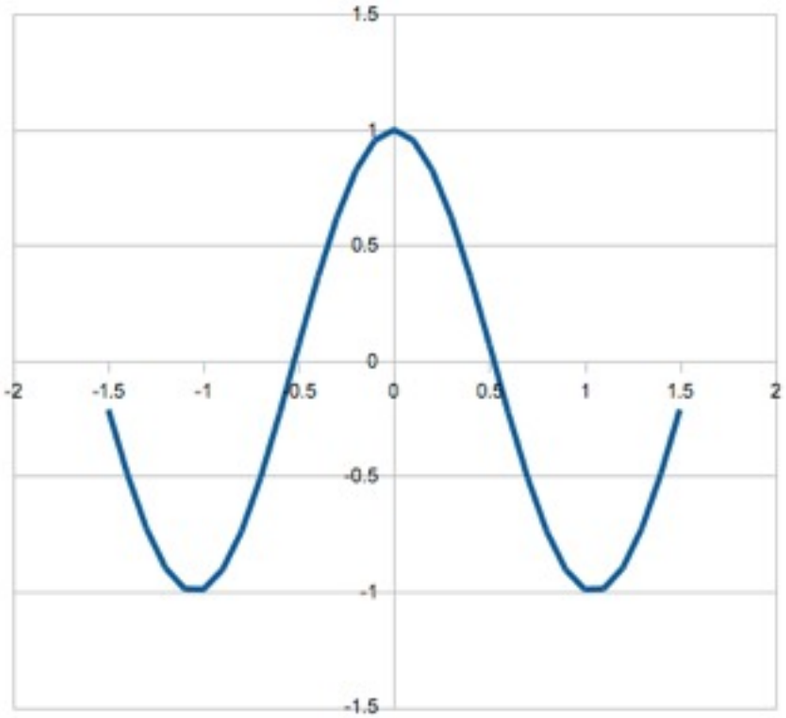
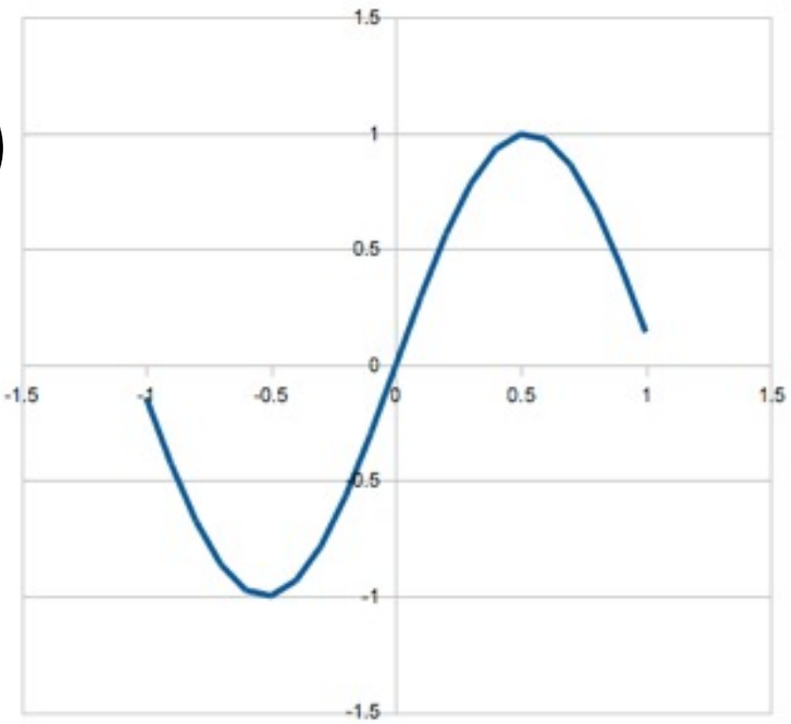
Which of the following graphs show an odd function?

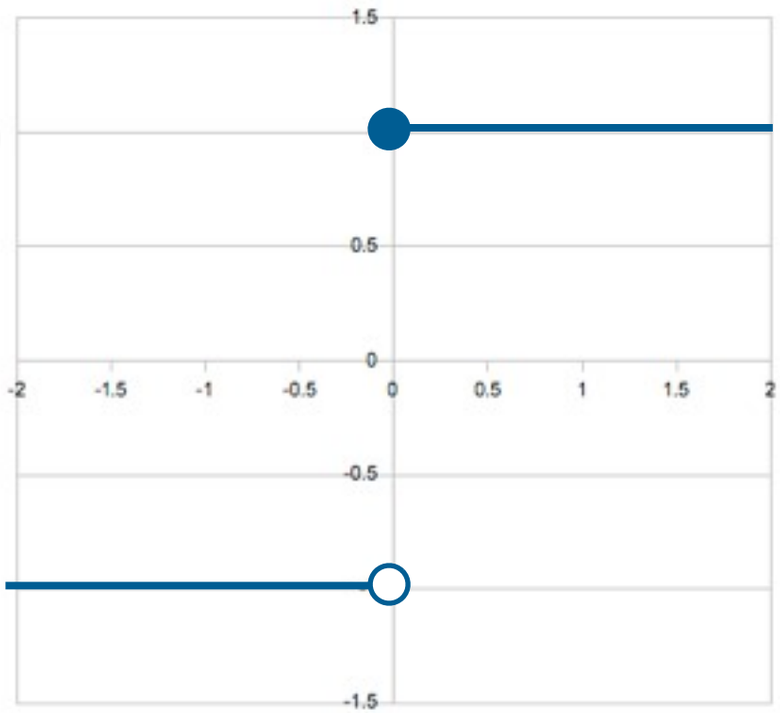
(A)



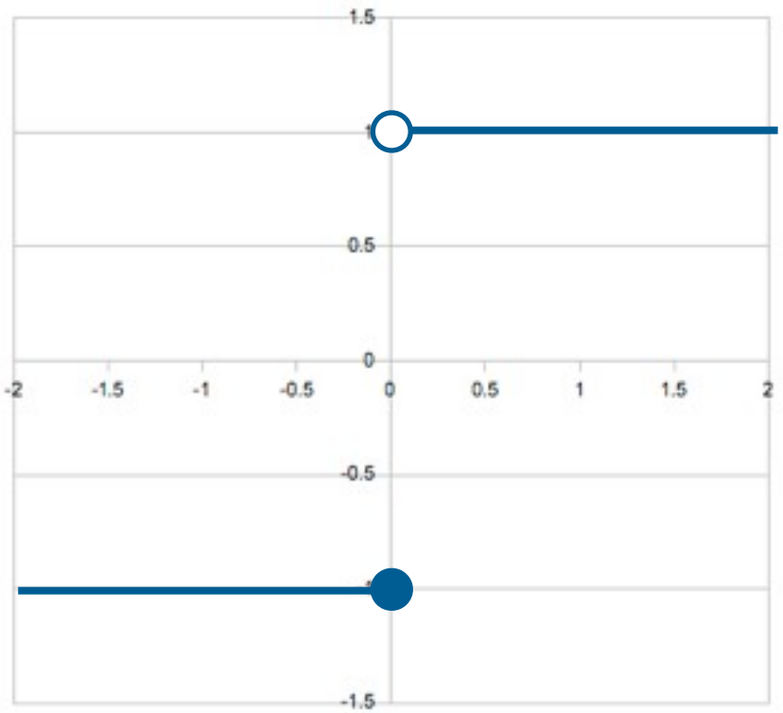
(B)



(C)



(D)



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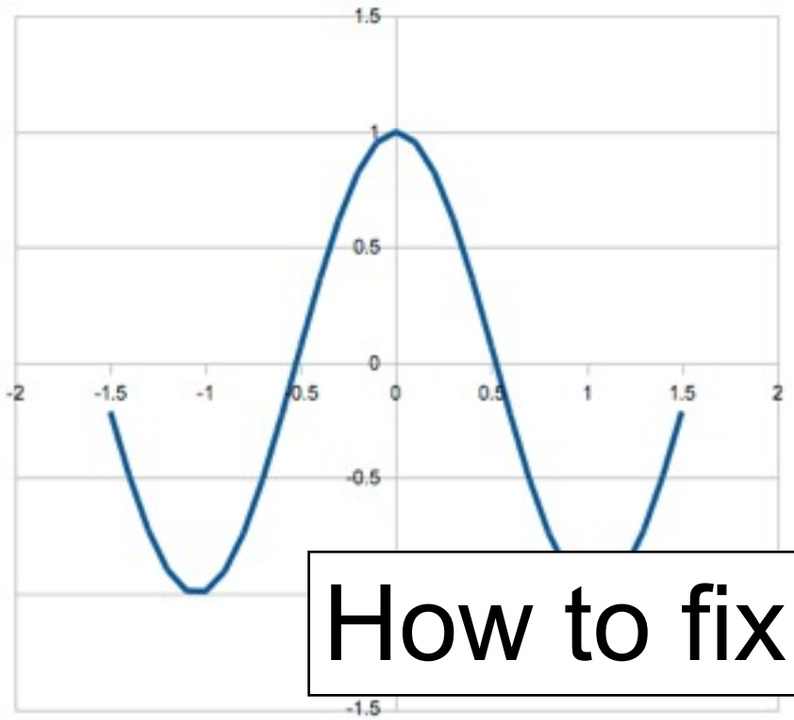
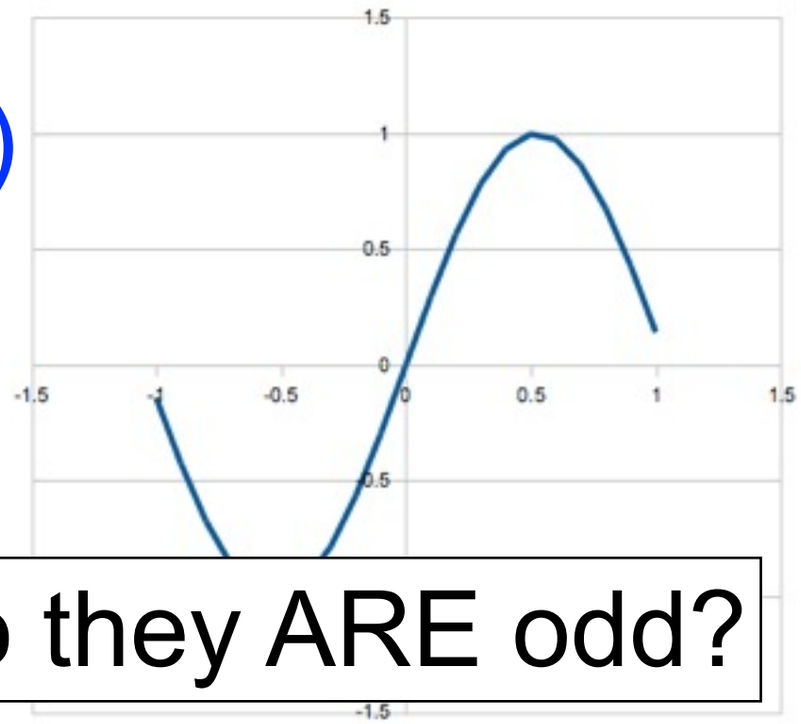
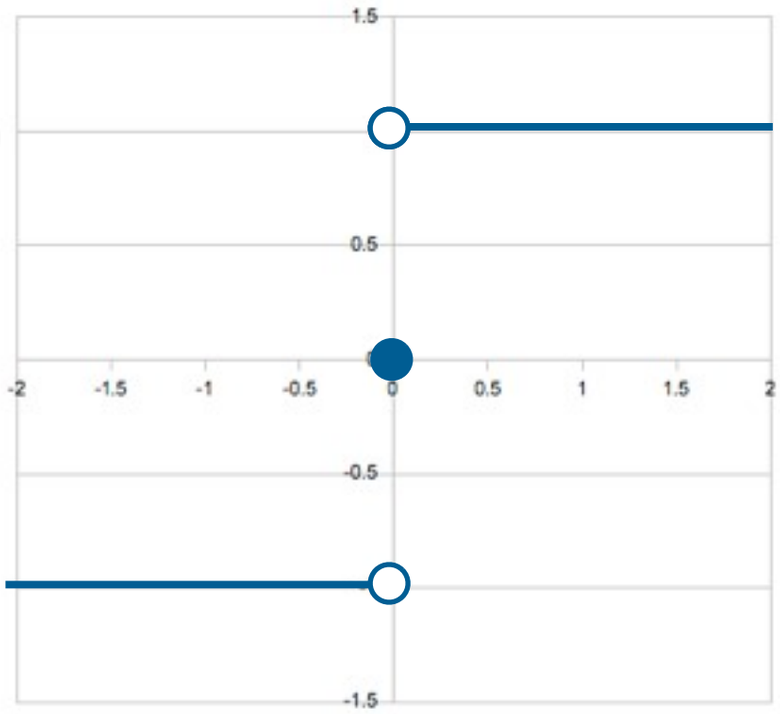


(B)

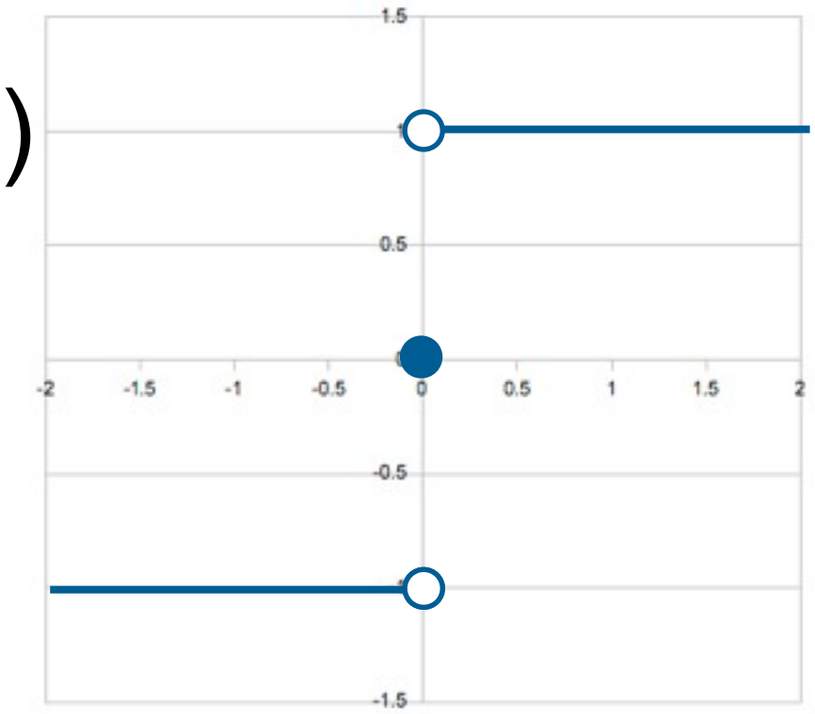


How to fix C/D so they ARE odd?

(C)



(D)



Hill functions

$$f(x) = \frac{ax^n}{b^n + x^n}$$

- A useful function for studying saturating phenomena
- Important functions in biochemistry - Michaelis-Menten kinetics
- We will see these several times this semester.

What is the domain of f(x)?

$$f(x) = \frac{ax^2}{b^2 + x^2}$$

(A) All real numbers x except for x=-b.

(B) All real numbers x except for x=b.

(C) All real numbers x.

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