score	possible	problem
	20	1
	20	2
	30	3
	30	4
	100	

Name: ______________________________

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Work in groups of 3 or 4. Show your work. Aknowledge any help on these specific problems.

/20 1. Sketch the graph of a single function that has all of the following properties:

(a) f is odd.

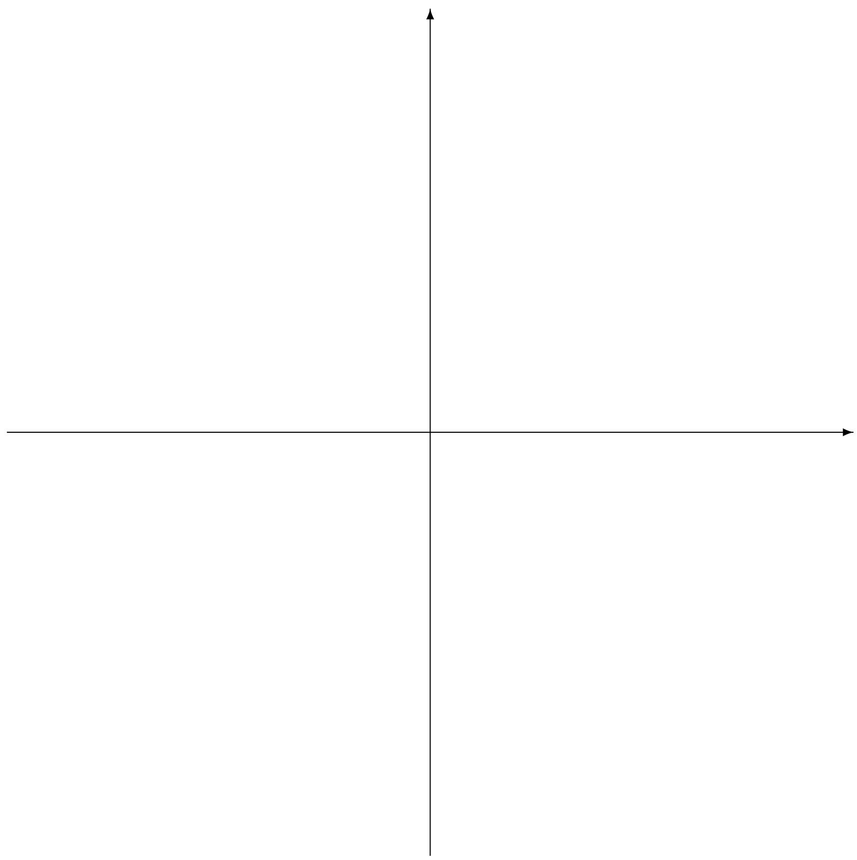
(b) $f'(x) < 0$ for $0 < x < 2$.

(c) $f'(x) > 0$ for $x > 2$.

(d) $f''(x) > 0$ for $0 < x < 3$.

(e) $f''(x) < 0$ for $x > 3$.

(f) $\lim_{x\to\infty} f(x) = -2$.



/20 2. Sketch the graph of a single function that has all of the following properties:

(a) Continuous and differentiable everywhere except at $x = -3$, where it has a vertical asymptote.

(b) A horizontal asymptote at $y = 1$.

(c) An x-intercept at $x = -2$.

(d) A y-intercept at $y = 4$.

(e) $f'(x) > 0$ on the intervals $(-\infty, -3)$ and $(-3, 2)$.

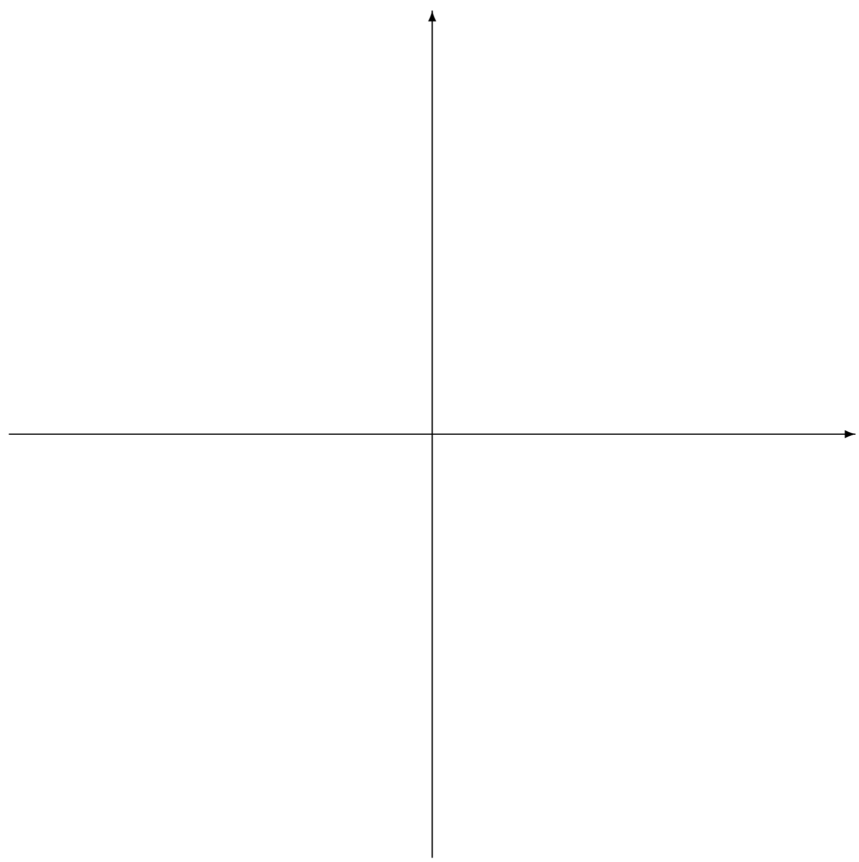
(f) $f'(x) < 0$ on the interval $(2, \infty)$.

(g) $f''(x) > 0$ on the intervals $(-\infty, -3)$ and $(4, \infty)$.

(h) $f''(x) < 0$ on the interval $(-3, 4)$.

(i) $f'(2) = 0$.

(j) An inflection point at $(4, 3)$.



/30 3. For the function

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

(a) Find the y-intercept.

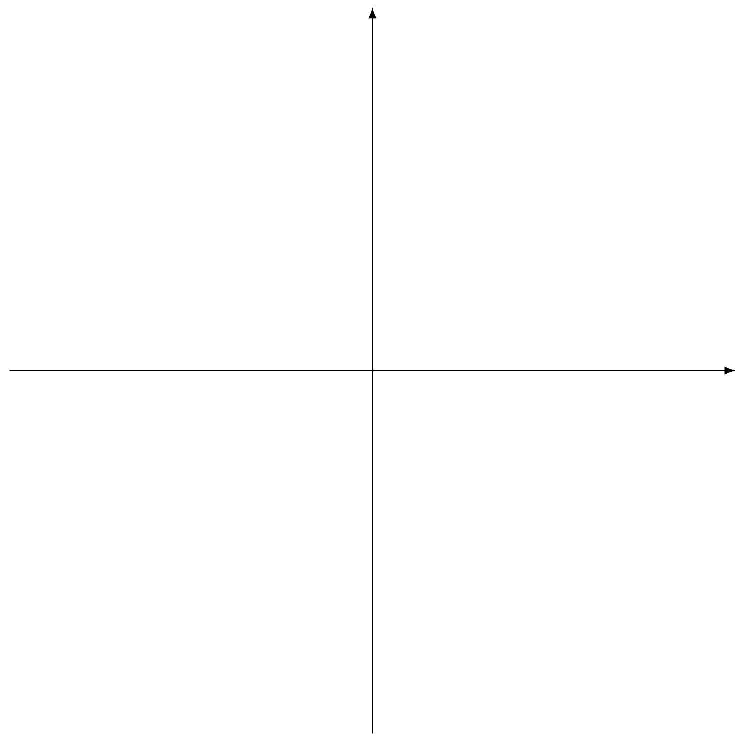
(b) Find any asymptotes.

(c) Find the intervals on which f is increasing or decreasing.

(d) Find the local maximum and minimum values of f.

(e) Find the intervals of concavity and the inflection points.

(f) Use the information above to sketch the graph.



/30 4. For the function

$$f(x) = xe^{-x}$$

(a) Find the x- and y-intercepts.

(b) Find any asymptotes.

(c) Find the intervals on which f is increasing or decreasing.

(d) Find the local maximum and minimum values of f.

(e) Find the intervals of concavity and the inflection points.

(f) Use the information above to sketch the graph.