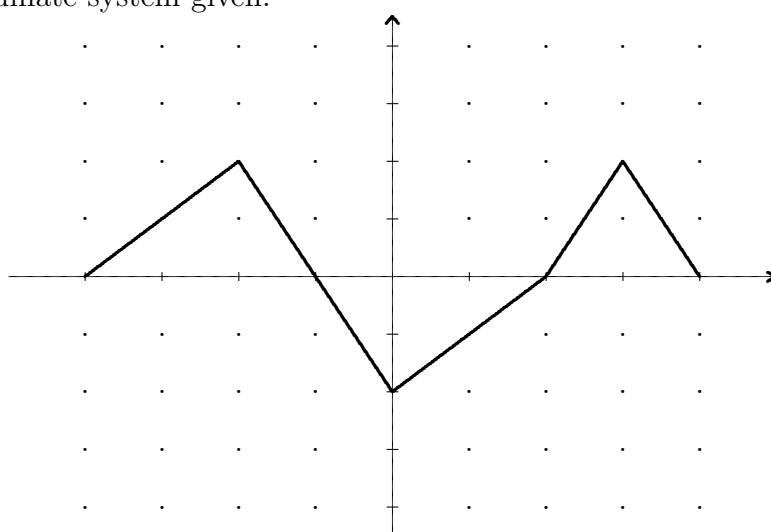
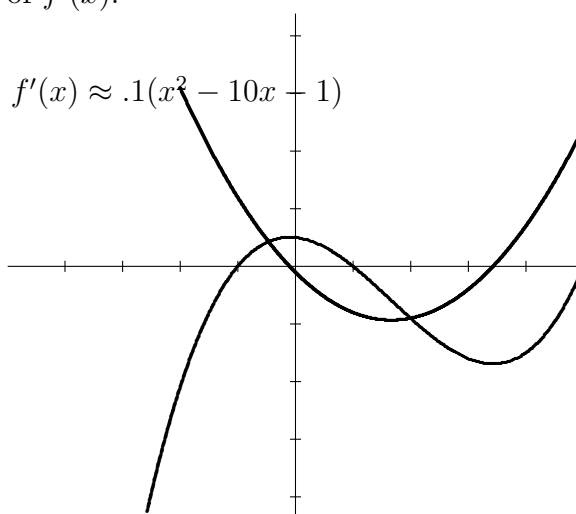


4. (10 points) Sketch an example of a continuous function $f(x)$ that has domain $[-4, 4]$, and satisfies the following requirements.
- (a) $f(-4) = f(-1) = f(2) = 0$.
 - (b) f is increasing on $[-4, -2]$.
 - (c) f has a singular point at $x = 3$.
 - (d) f has a relative maximum at $x = 3$ and a value of 2 at $x = 3$.

Use the coordinate system given.



5. (10 points) Let f be the function whose graph is shown below. On the same axes, plot the graph of $f'(x)$.



6. (10 points) Sketch an example of a function $f(x)$ that has domain $[-4, 4]$, and satisfies the following requirements. Please note: this problem has been slightly modified from the original, which interchanged the 1 and the 2 in the first two conditions.

(a) $\lim_{x \rightarrow -2^+} f(x) = 1.$

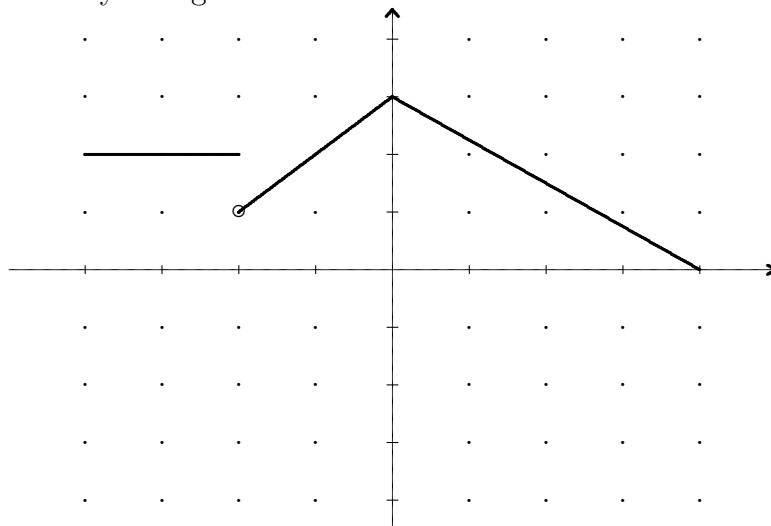
(b) $\lim_{x \rightarrow -2^-} f(x) = 2.$

(c) $f(2) = 0, f(0) = 3$

(d) f is linear on the interval $[0, 4]$.

(e) f has an absolute maximum at $x = 0$.

Use the coordinate system given.



7. (10 points) Solve the equation $2 + 3 \cdot 5^{2x+1} = 77.$

8. (10 points) Compound Interest. Find the time required for an 8% investment compounded quarterly to triple.

9. (12 points) Compute the following limits.

(a) $\lim_{x \rightarrow \infty} \frac{3x^3 - 5x^2 + 10}{2x^3 + 10x - 5}$.

(b) $\lim_{x \rightarrow 2} \frac{x - 2}{x^2 - 4}$.

(c) $\lim_{x \rightarrow 9} \frac{\sqrt{x} - 3}{x - 9}$.

10. (12 points) Find the following derivatives.

(a) $\frac{d}{dx} x e^x$

(b) $\frac{d}{dx} \frac{\ln(x)}{x}$

(c) $\frac{d}{dx} e^{\ln(x^5+x^2-2x)}$

11. (10 points) Let

$$f(x) = \begin{cases} -x/2 + 2 & \text{if } x \leq -1 \\ x + 3 & \text{if } -1 < x < 3 \\ x^2 - 5x & \text{if } 3 \leq x \end{cases}$$

Find an equation for the line tangent to the graph of f at the point $(4, -4)$.