

Homework 6: Due Friday March 24th in recitation.

Homework submitted 10 minutes after recitation has begun is considered late and will not be accepted.
Write on only one side of each page. Staple all work.

1. Let

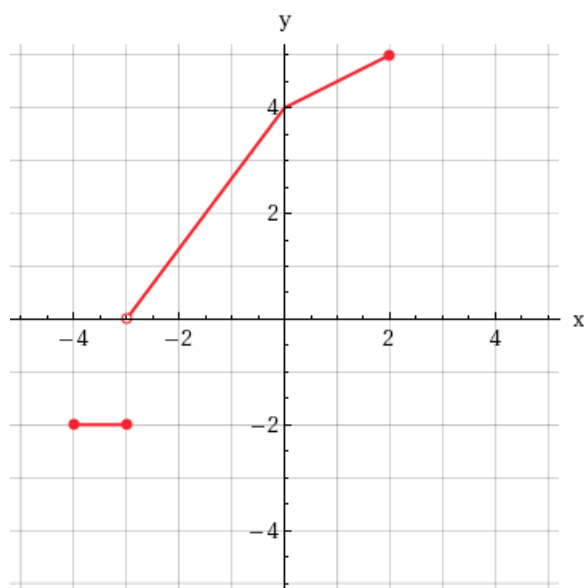
$$f(x) = \begin{cases} x & \text{if } x \text{ is rational} \\ 0 & \text{otherwise} \end{cases}$$

What is the domain and the range of f .

2. Graph the function

$$f(x) = \begin{cases} -x & \text{if } x < 0 \\ 9 + x^2 & \text{if } 0 \leq x < 5 \\ 5 & \text{if } x \geq 5 \end{cases}$$

3. Consider the curve in the xy -plane

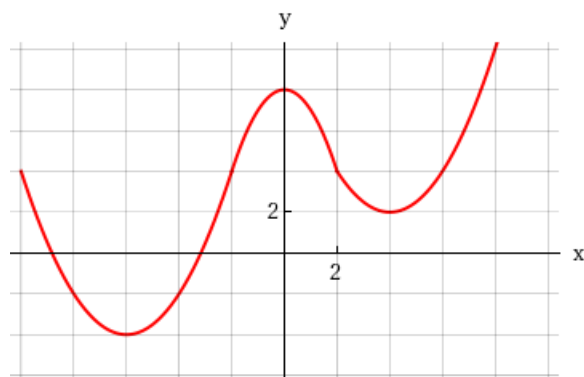


Write $f(x)$ as a peicewise function.

4. Let $f(x) = x^2 + 16x$ and $g(x) = 8x - 16$.

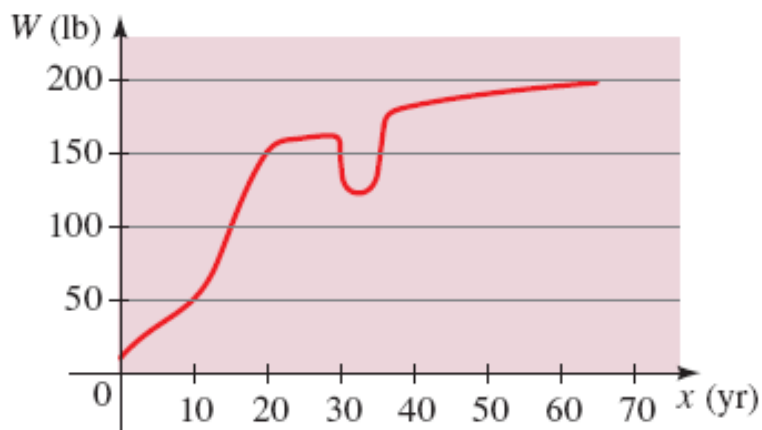
- (a) At what point(s), if any, do the graphs of $f(x)$ and $g(x)$ intersect. Note that your answer should be of the form (x, y) .
- (b) When is $f(x) > g(x)$. Write your final answer in interval notation.

5. Consider the curve in the xy -plane



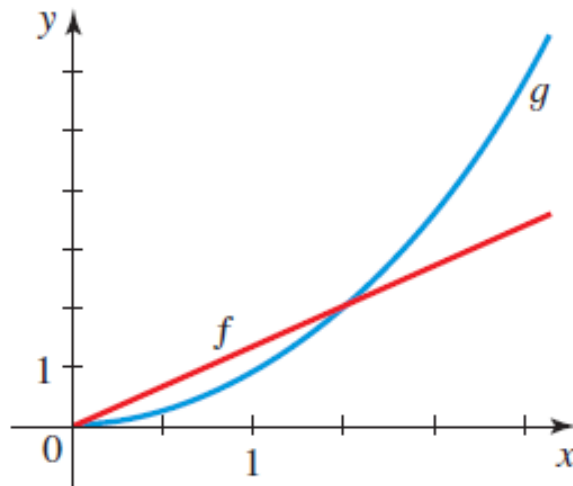
- Where is $f(x)$ decreasing? Write your answer in interval notation.
- Where is $f(x)$ increasing? Write your answer in interval notation.
- What are the local maximum(s), if any, and the value x at which each occurs. Give your answer as an ordered pair (x, y) .
- What are the local minimum(s), if any, and the value x at which each occurs. Give your answer as an ordered pair (x, y) .

6. The graph gives the weight W of a person at age x .



- At what ages is weight increasing? At what ages is weight decreasing?
- Find the net change in weight from age 10 to 20. Why do you think the net change is positive.

7. Let $f(x) = \frac{1}{x+x^2}$. Find the average rate of change of f from $x = a$ to $x = a + h$.
8. Below are the graphs of f and g .



Let $ARC_f(a, b)$ denote the average rate of change of f from $x = a$ to $x = b$. Similar definition for $ARC_g(a, b)$.

- (a) Which is larger $ARC_f(0, 1)$ or $ARC_g(0, 1)$. What about $ARC_f(2, 2.5)$ and $ARC_g(2, 2.5)$. Explain.
- (b) Find a and b such that $ARC_f(a, b) = ARC_g(a, b)$