Math 141 Midterm 1

Name: _____

1. Draw the graph of one function g with all of the following properties:

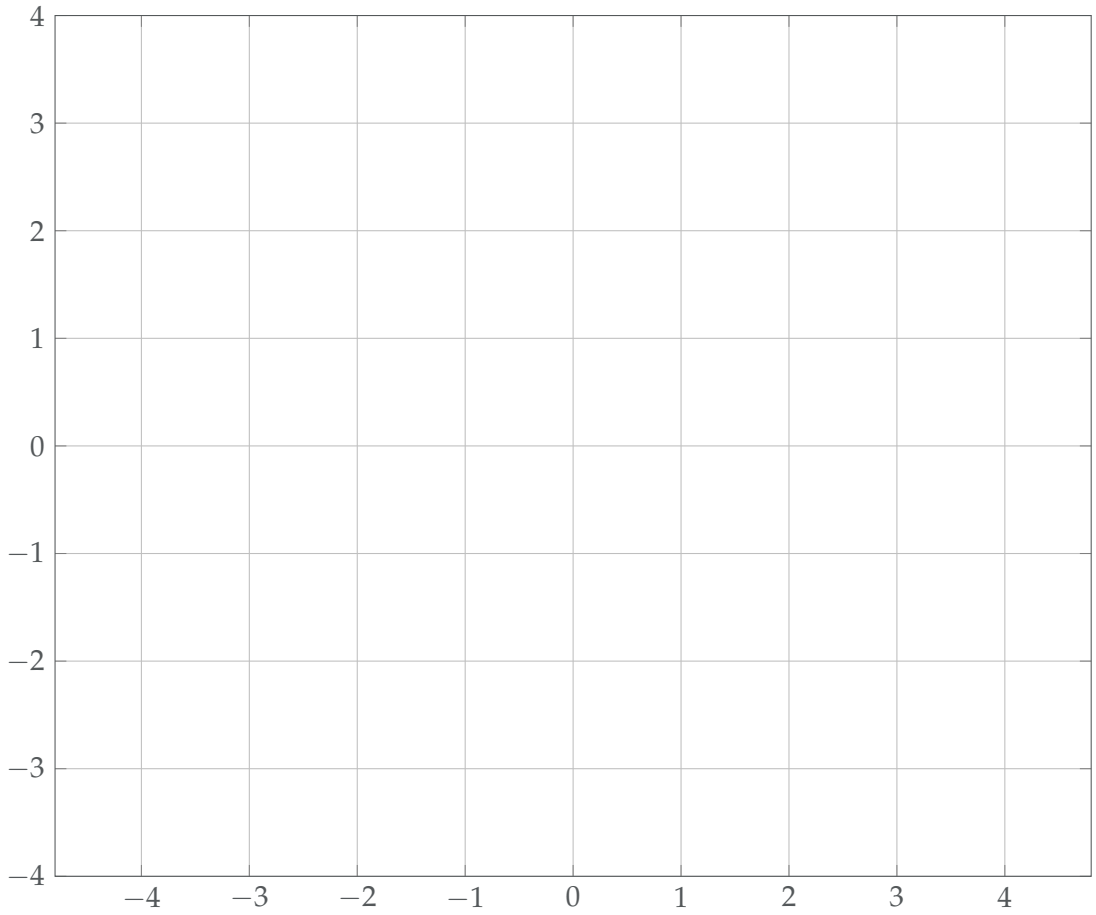
a. $\lim_{x \to -2^-} g(x) = -1$ and $\lim_{x \to -2^+} g(x) = 1$.

b. $\lim_{x \to 0} g(x) = \infty$.

c. $\lim_{x \to 1^-} g(x)$ does not exist.

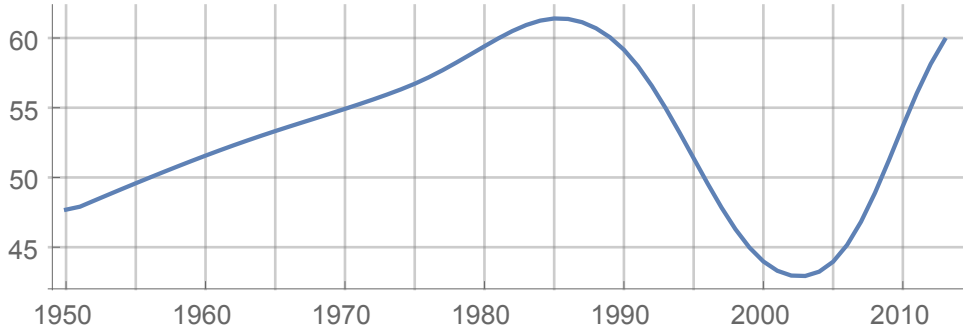
d. $\lim_{x \to 2} g(x)$ exists but g is not continuous at 2.

e. The domain of g is $(-4, 4)$.



2. A ball dropped from a height of 16 feet has a height of $f(t) = 16 - 16t^2$ feet after t seconds. By taking limits (do not use the power rule for derivatives), find the velocity of the ball when it hits the ground.

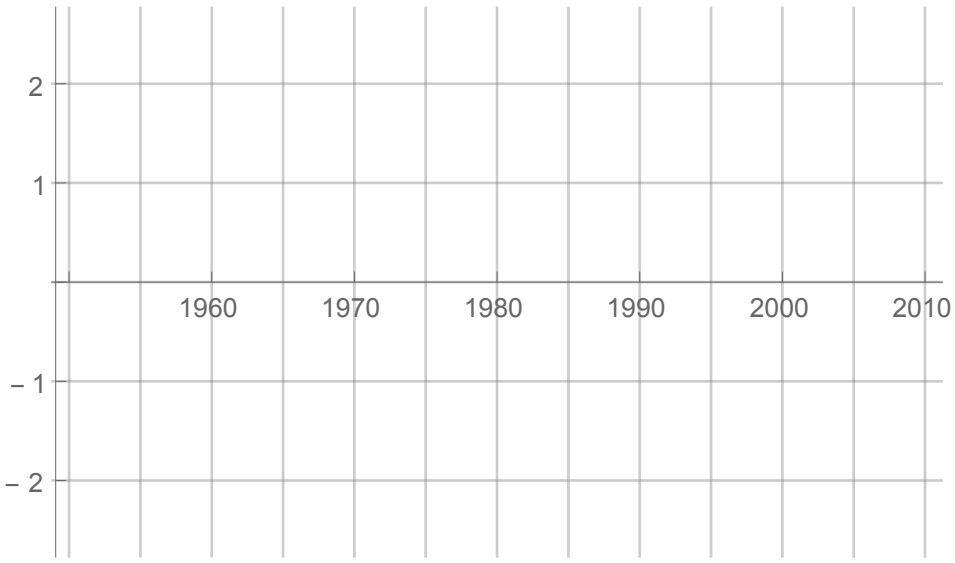
3. Let $f(t)$ be the life expectancy of a person born in year t in Zimbabwe. The actual graph of $f(t)$ is here:



a. What is the average rate of change in life expectancy of a Zimbabwean between 1950 and 1970?

b. Approximately what is $f'(1990)$? In English words, what is the meaning of $f'(1990)$

c. Sketch the graph of $f'(t)$ here:



4. Find the line tangent to the curve given implicitly by $y^3 = 5xy + 1$ at the point $(0, 1)$.

5. Standing 3000 feet away from the launch pad, you are watching a rocket shooting straight up into space. When the rocket is 4000 feet in the air, the rocket is moving 500 feet per second. How fast is the distance between you and the rocket changing at this moment?