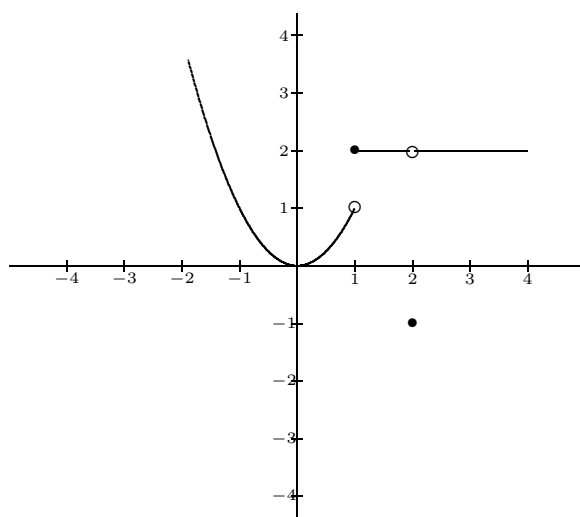


July 20, 1999

Your name _____

On all the following questions, **show your work.**

1. (20 points)



(a) $\lim_{x \rightarrow 1} f(x) =$

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

(c) Estimate $f'(-1)$, and explain why your estimate is worthy.

(d) Estimate $f'(0)$. Explain your answer.

2. (15 points) Use the *method of bisection* to approximate the zero of $x^3 - 5$. Carry out the process until the interval containing the zero has no more than 0.25.

3. (20 points) Let $f(x) = 3x^2 + 1$

(a) Compute the derivative f' of f *using the definition of derivative*.

(b) What is the slope of the line tangent to the graph of f at the point $(1, 4)$?

(c) Find an equation for the line tangent to the graph of f at the point $(1, 4)$

4. (30 points) Compute the following derivatives.

(a) Let $f(x) = x^2 - 1/x$. Find $\frac{d}{dx}f(x)$.

(b) Let $g(x) = \sqrt{x^2 + 4}$. What is $g'(x)$?

(c) Find $\frac{d}{dx}(2x + 1)^4 \cdot (4x^2 - 1)$

(d) Find $\frac{d}{dx} \frac{2x+1}{x^2+2}$

(e) Find $\frac{d}{dt}(t^{-1} + t^{-2})^3$.

5. (20 points) Let $C(x) = 8000 + 200x - 0.1x^2$, for $0 \leq x \leq 400$ be the cost in dollars of producing x air conditioners.

(a) Find the cost of producing the 301st air conditioner.

(b) Find the average cost function $\bar{C}(x)$.

(c) Find the rate of change of the cost with respect to x when $x = 300$.