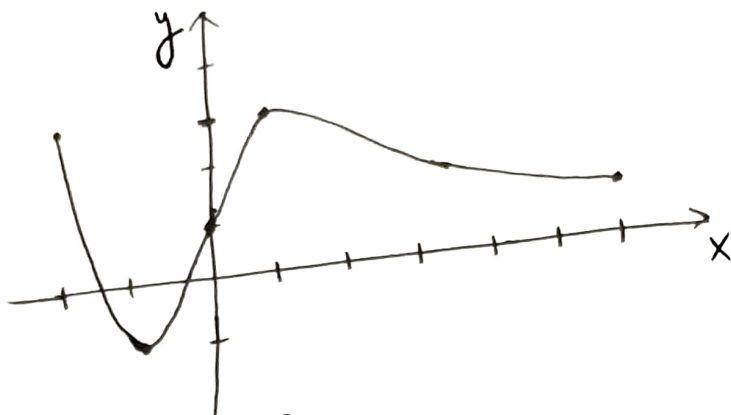


TEST-1REVIEW

1) Use the following graph of a function  $f(x)$  to answer the following questions:



(a) What is  $f^{-1}(3)$ ?

(b) For what values of  $x$  is  $f(x) = 3$ ?

(c) State the domain and range of  $f(x)$ ?

(d) State the intervals where  $f(x)$  is increasing, decreasing.

2) Evaluate the following:

(a)  $\log 4 + \log 25 - \log 1$

(c)  $\log_2 32$

(b)  $e^{\ln(\ln 2e)}$

(d)  $\ln(1/e^2)$

3) Solve each eq<sup>n</sup> for  $x$ :

(a)  $e^{7-4x} = 6$

(b)  $\ln(3x-10) = 2$

4) Find the solution set for  $1 < e^{3x-1} < 2$

5) If  $f(x) = 3x^2 - x + 2$ , find  $f(2)$ ,  $f(-2)$ ,  $f(a)$ ,  $f(a+h)$ ,  $2f(a)$ ,  $f(a^2)$ , and  $\frac{f(a+h) - f(a)}{h}$ .

6) If  $f(x) = x^2 - 2x + 3$ , evaluate the difference quotient for  $f(x) = \frac{x+8}{x+3}$ .

7) Evaluate the difference quotient for  $f(x) = \frac{x+8}{x+3}$ . Simplify your answer.

8) Find the domain of the function. Express your answer in interval notation.

(a)  $f(x) = \frac{2}{3x-1}$

(b)  $f(x) = \frac{4x-1}{2x+3}$

(c)  $g(x) = \sqrt{16-x^2}$

(d)  $h(x) = \ln(x+6)$

(e)  $g(t) = \frac{t^2-1}{t+1}$

9) Under ideal conditions a certain bacteria population is known to double every two hours. Suppose that ~~they~~ there are initially 90 bacteria.

(a) What is the size of the population after 10 hrs?

(b) What is the size of the population after  $t$  hrs?

10) Sketch the graph of the function and use it to determine the values of "a" for which  $\lim_{x \rightarrow a} f(x)$  exists.

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

11) Evaluate the limit, if it exists:

$$(i) \lim_{x \rightarrow 2^-} \frac{-3}{x-2}$$

$$(ii) \lim_{x \rightarrow 0} \frac{1}{x^3}$$

$$(iii) \lim_{x \rightarrow \infty} \frac{(x+2)(x-3)}{3x^2+4x+1}$$

$$(iv) \lim_{x \rightarrow \infty} \frac{3x^5+2x^4+1}{-4x^4-3}$$

$$(v) \lim_{x \rightarrow 1} \frac{-4x}{x-1}$$

$$(vi) \lim_{x \rightarrow 0} \frac{x(x^2-1)}{x+1}$$

$$(vii) \lim_{x \rightarrow \infty} \frac{1}{x+2}$$

$$(viii) \lim_{x \rightarrow -3} \frac{2x^2+11x+15}{x^2-x-12}$$

$$(ix) \lim_{x \rightarrow 1} \frac{2-x}{(x-1)^2}$$

$$(x) \lim_{x \rightarrow 2^+} \frac{x^2-2x-8}{x^2-5x+6}$$

$$(xi) \lim_{t \rightarrow -3} \frac{t^2-9}{2t^2+7t+3}$$

$$(xii) \lim_{x \rightarrow 3} \frac{\frac{1}{x} - \frac{1}{3}}{x-3}$$

$$(xiii) \lim_{h \rightarrow 0} \frac{(-5+h)^2-25}{h}$$

$$(xiv) \lim_{u \rightarrow 2} \frac{\sqrt{4u+1}-3}{u-2}$$

12) Show that  $\ln x = -x^2$  has a solution on  $(\frac{1}{e}, e)$ .

13) Sketch a graph of a function  $g(x)$  satisfying the following:

$$\lim_{x \rightarrow -7} f(x) = -\infty, \lim_{x \rightarrow -3} f(x) = \infty, \lim_{x \rightarrow 0} f(x) = \infty, f(2) = 0,$$

$$\lim_{x \rightarrow 4^-} f(x) = -\infty, \lim_{x \rightarrow 4^+} f(x) = \infty, \lim_{x \rightarrow \infty} f(x) = 0, \lim_{x \rightarrow -\infty} f(x) = 0$$

$$f(5) = 0$$

14) Find the following limits:

(a)  $\lim_{x \rightarrow \infty} \frac{1-x^2}{x^3-x+1}$

(b)  $\lim_{x \rightarrow -\infty} \frac{x-x\sqrt{x}}{2x^{3/2}+3x-5}$

(c)  $\lim_{x \rightarrow -\infty} \frac{x^4-3x^2+x}{x^3-x+2}$

15) Find an equation of the line tangent to  $y = \frac{x^2-1}{2x-3}$  at

(1,0)

16) If a rock is thrown upward on the planet Mars with a velocity of 10 m/s, its height (in meters) after  $t$  seconds is given by  $H = 10t - 1.86t^2$ .

(a) Find the velocity of the rock after one second.

(b) Find the velocity of the rock when  $t = "a"$ .

17) If  $f(x) = 3x^2 - x^3$ , find  $f'(1)$  and use it to find an equation of the tangent line to the curve  $y = 3x^2 - x^3$  at the point (1,2).

18) Find  $f'(a)$ .

(a)  $f(x) = 3x^2 - 4x + 1$

(c)  $f(t) = \frac{2t+1}{t+3}$

(b)  $f(t) = 2t^3 + t$

(d)  $f(x) = x^{-2}$

19) Draw a rough sketch of the graphs of the following functions:

(i)  $y = (x-3)^2$

(ii)  $y = x^3 + 1$

(iii)  $y = |x| - 2$



$$(iv) y = 2 - \sqrt{x}$$

$$(v) y = 3 - 2\cos x$$

$$(vi) y = |x - 2|$$

20) Find a formula for the inverse of the function:

$$(i) f(x) = 1 + \sqrt{2+3x}$$

$$(ii) f(x) = e^{2x-1}$$

$$(iii) y = \ln(x+3)$$

$$(iv) y = \frac{1 - e^{-x}}{1 + e^{-x}}$$

21) Find the ~~derivative~~ derivative of the function using the definition of derivative. State the domain of the function and the domain of its derivative

$$(i) f(x) = 4 + 8x - 5x^2$$

$$(ii) G(t) = \frac{1-2t}{3+t}$$

$$(iii) g(x) = \sqrt{9-x}$$