

Test 1

Calculus I  
MATH 125-07September 17, 2019  
Dr. Abdul-Rahman

Name: \_\_\_\_\_

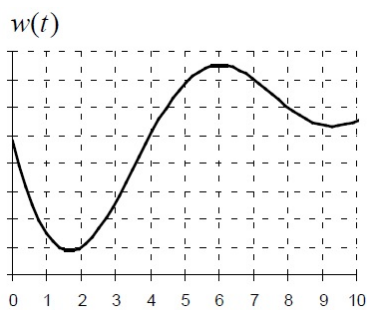
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1. [15 points] At time  $t$  in seconds, an object's distance from a point is given by  $s(t) = (\ln 5)^t$  in centimeters.
- (a) Find the average velocity of the object between  $t = 1$  and  $t = 3$  seconds (include units).

(b) Find the velocity of the object at time  $t = 4$ .

(c) Use the definition of derivative (as a limit) to represent  $s'(t)$  (do not simplify).

2. [10 points] Use the graph of  $w(t)$  to order the values below from smallest (1) to largest (4).



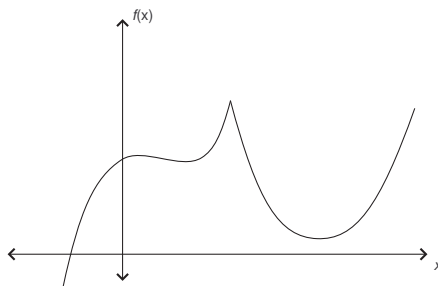
( ) The rate of change at  $t = 6$ .

( ) The average rate of change over  $1 \leq t \leq 10$ .

( ) The slope of  $w(t)$  at  $t = 0.5$ .

( )  $\left. \frac{dw}{dt} \right|_{t=7}$ .

3. [10 points] Use the graph of  $f(x)$  shown below to sketch a graph of  $f'(x)$ , use the same axes.



4. [15 points] Find the following limits, give exact simplified answers

(a)  $\lim_{\theta \rightarrow \frac{1}{2}} \sin(\pi\theta)$ .

(b)  $\lim_{x \rightarrow \infty} \frac{2 - x^3 + 3x}{7x^3 + 2x - 1}$ .

(c)  $\lim_{t \rightarrow 2} \frac{2t^2 - t^3}{(t - 2)(t + 3)}$ .

5. [20 points] Let

$$f(x) = \begin{cases} \frac{x+4}{x-2} & x \leq 5 \\ 3e^{5-x} & x > 5 \end{cases}$$

(a) Is  $f(x)$  continuous at  $x = 5$ ? Explain.

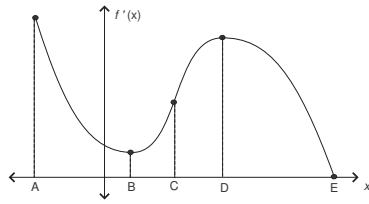
(a) Is  $f(x)$  continuous on  $[1, 4]$ ? Explain.

(b) Find  $\lim_{x \rightarrow \infty} f(x)$ .

(b) Find  $\lim_{x \rightarrow -\infty} f(x)$ .

6. [10 points] Find the equation of the tangent line of  $f(x) = \pi^{-2x} + x^{2\pi}$  at  $x = 1$  (give an exact answer).

7. [20 points] Use the graph of  $f'(x)$  and the indicated letters  $A, B, C, D, E$  to answer the following, Explain.



(a) Over what interval(s) is  $f'(x)$  concave down?

(b) Over that interval(s) is  $f''(x)$  positive?

(c) Where is  $f''(x)$  greatest?

(d) Where does  $f(x)$  have horizontal tangent line?