Semester Review Topics

15. $\lim_{x \to 0^+} \dfrac{1 + \sin(x)}{x}$ is

(A) 0

(B) 1

(C) 2

(D) π

(E) ∞

$$\lim_{x \to 0} \frac{\sin 5x}{x}$$

Tangent Line

Find the equation of the line tangent to the curve $f(x) = x^3 - 4x$ at $x = 0$.

Increasing Functions

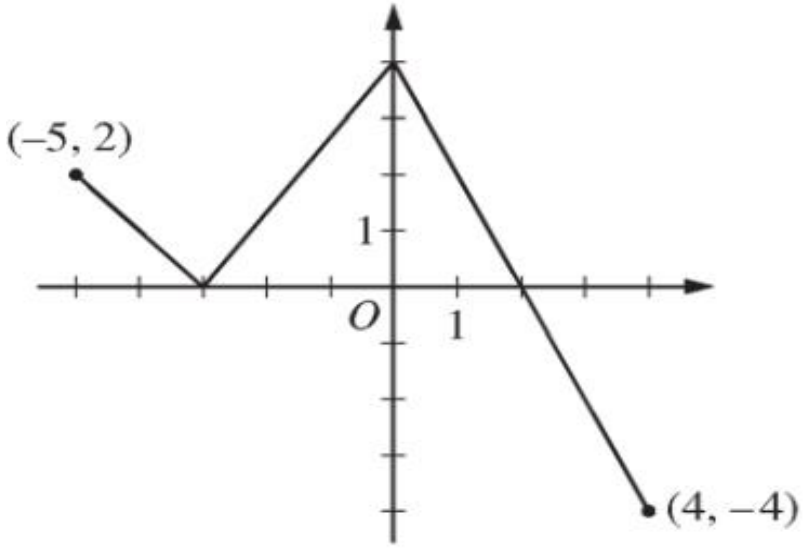
What are all values of x for which the function f defined by $f(x) = x^3 - 4x$ are increasing

Inflection Points

Determine any points of inflection for the curve $f(x) = x^3 - 4x$

Let f be the differentiable function whose graph is shown in the figure. The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s(t) = \int_0^x f(t)dt$ Use the graph of f(x) below to answer the questions.

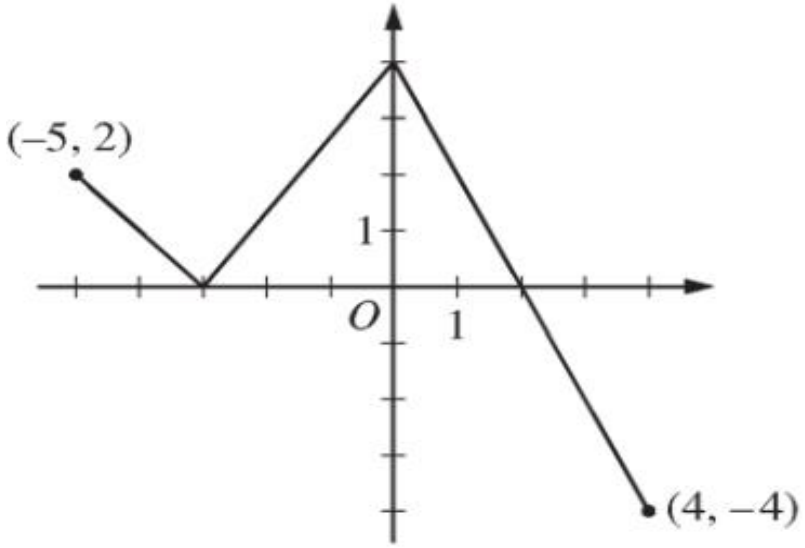
a. Find the velocity of the particle at t = 2.



Graph of f

Let f be the differentiable function whose graph is shown in the figure. The position, in meters, at time t (sec) of a particle moving along a horizontal coordinate axis is given by $s(t) = \int_0^x f(t)dt$ Use the graph of f(x) below to answer the questions.

b. Find the acceleration of the particle at t = 2.



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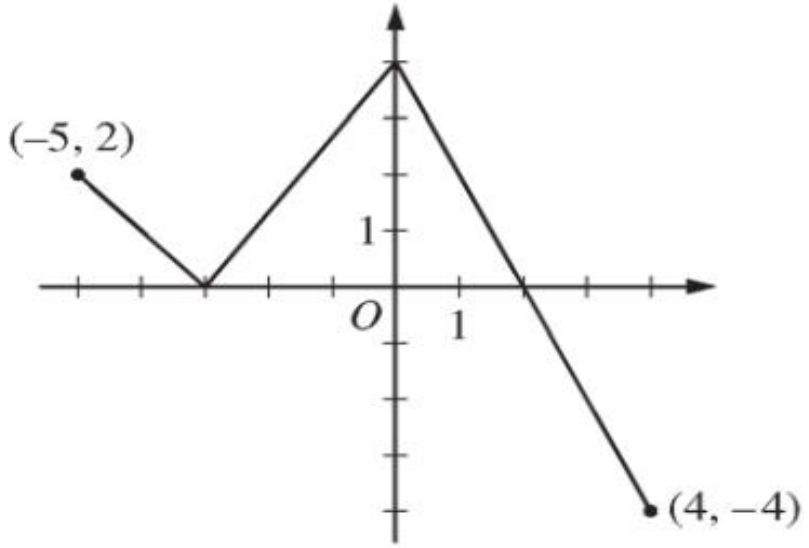
c. Find the absolute maximum and minimum of s(t) on the given interval.



Graph of f

Use the data below to approximate the area under the curve using the Trapezoid Rule with 4 sub-intervals.

t	0	2	5	9	10
H(t)	66	60	52	44	43

Use the data below to approximate the area under the curve using a Right Riemann Sum with 4 sub-intervals.

t	0	2	5	9	10
H(t)	66	60	52	44	43

Use the data below to approximate the area under the curve using a Left Riemann Sum with 4 sub-intervals.

t	0	2	5	9	10
H(t)	66	60	52	44	43

- Hot water is dripping through a coffeemaker, filling a large cup with coffee. The amount of coffee in the cup at time t, from [0, 6], is given by a differentiable function C, where t is measured in minutes. Selected values of C(t), measured in ounces, are given in the table.

t(minutes)	0	1	2	3	4	5	6
C(t) ounces	0	5.3	8.8	11.2	12.8	13.8	14.5

t(minutes)	0	1	2	3	4	5	6
C(t) ounces	0	5.3	8.8	11.2	12.8	13.8	14.5

- Use a midpoint sum with three subinterval of equal length indicated by the data in the table to approximate the value of $\frac{1}{6}\int_0^6 C(t)dt.$

t(minutes)	0	1	2	3	4	5	6
C(t) ounces	0	5.3	8.8	11.2	12.8	13.8	14.5

- Using correct units, explain the meaning of $\frac{1}{6}\int_0^6 C(t)dt$ in the context of the problem.

t(minutes)	0	1	2	3	4	5	6
C(t) ounces	0	5.3	8.8	11.2	12.8	13.8	14.5

- Find the value of $C'(4.5)$

- Using correct units, explain the meaning of $C'(4.5)$ in the context of the problem.