

1. If $f(x) = x^3 + 3x^2 - 9x + 4$ for $-4 \leq x \leq 5$

Find where f

- a) increases $(-4, -3) \cup (1, 5)$
- b) decreases $(-3, 1)$
- c) concave up $(-1, 5)$
- d) concave down $(-4, -1)$
- e) inflection point(s) $(-1, 15)$
- f) relative max or relative min $(-3, 31)$ $(1, -1)$

$x^2 + 2x - 3$
 $f'(x) = 3x^2 + 6x - 9 = 0$
 $m(x+3)(x-1) = 0$ $\rightarrow$ rel min
 $f''(x) = 6x + 6$ $x = -1$ $f''(-1) = 0$ $\rightarrow$ inflection
 $-1 + 3 + 9 + 4$

Oct 31-8:21 AM

2. If $f(x)$ is continuous on $[0, 3]$ and satisfies the following conditions find each below:

- a) extreme values $\rightarrow$ rel max $(1, 2)$ $\rightarrow$ rel min None
- b) inflection points $\rightarrow$ find change in sign $\rightarrow$ none

Sketch the possible graph

x	0	1	2	3
f	0	2	0	-2

$f'(x)$ $\rightarrow$ 3 0 2 0 -3 $\rightarrow$ 1st D

$f''(x)$ $\rightarrow$ -6 0 6 0 -6

$f''(x)$ $\rightarrow$ 0 1 2 3 4

Oct 31-8:21 AM

2. Assuming $f'(x)$ exists for all values of x sketch a basic shape of the graph f with the following properties:

- 1st der $< 0, x < 1$
- $f'(x) = 0, x = 1$
- $< 0, 1 < x < 2$
- $= 0, x = 2$
- $> 0, x > 2$

rel min $x=1$ $\rightarrow$ rel max $x=2$

Oct 27-12:33 PM

3. Position function of a particle is given by $s(t) = \frac{1}{3}t^3 - 2t^2 + 8t + 1, t \geq 0$. Describe the motion of the particle and make a sketch.

$v(t) = t^2 - 4t + 8$
 $a(t) = 2t - 4 = 0$

Right $\rightarrow v(t) +$
Left $\rightarrow v(t) -$
Speed inc $v(t)$ and $a(t)$ same sign
Speed dec $v(t)$ and $a(t)$ diff sign

Motion:
Right: $(0, 2) \cup (4, \infty)$
Left: $(2, 4)$
Speed inc: $(2, 3) (4, \infty)$
Speed dec: $(0, 2) (3, 4)$

Oct 31-8:21 AM

3. A position function of a particle is given by $s(t) = \frac{1}{3}t^3 - 2t^2 + 8t + 1, t \geq 0$. Describe the motion of the particle and make a sketch.

$v(t)$ $\rightarrow$ 1st der

$a(t)$ $\rightarrow$ 2nd der

$t = 1$ speed $|v|$ $\rightarrow$ min

$t = 2$ speed $|v|$ $\rightarrow$ max

$t = 4$ speed $|v|$ $\rightarrow$ min

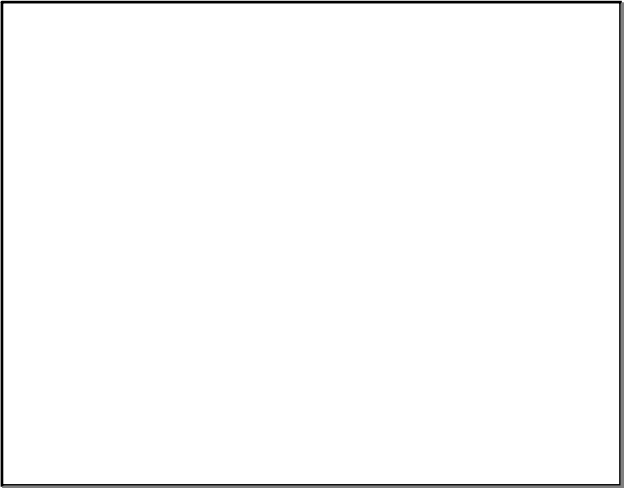
$t = 3$ speed $|v|$ $\rightarrow$ max

Nov 27-8:00 AM

4. The figure above shows the graph of f' , the derivative of f , not the graph of f . The domain of f is the set of all real numbers x such that $-3 < x < 5$.

- a) For what values of x does f have a relative max? why?
- b) For what values of x does f have a relative min? why?
- c) On what intervals is the graph of f concave upward? Use f' to justify

Oct 31-7:57 AM



Oct 28-6:45 AM