92.) $f'(x) = -12(x-2)^2(x-4)$

a.) $+ \quad + \quad -$

$2 \quad 4$

max

rel. max $x = 4$

decr : $(4, \infty)$

$f''(x) = -12(x-2)(3x-10)$

$- \quad + \quad -$ f''

$2 \quad \frac{10}{3}$

POI: $x = 2, \frac{10}{3}$

CCD: $(-\infty, 2)$ $(\frac{10}{3}, \infty)$

$f'(2) = 0$

$f''(2) = 21$

Rel. min @ $x = 2$

3.3: relative extrema/increasing/decreasing intervals (1st derivative test) Justify

3.4: POI/ intervals of concavity and 2nd derivative test Justify

3.5: Curve sketching

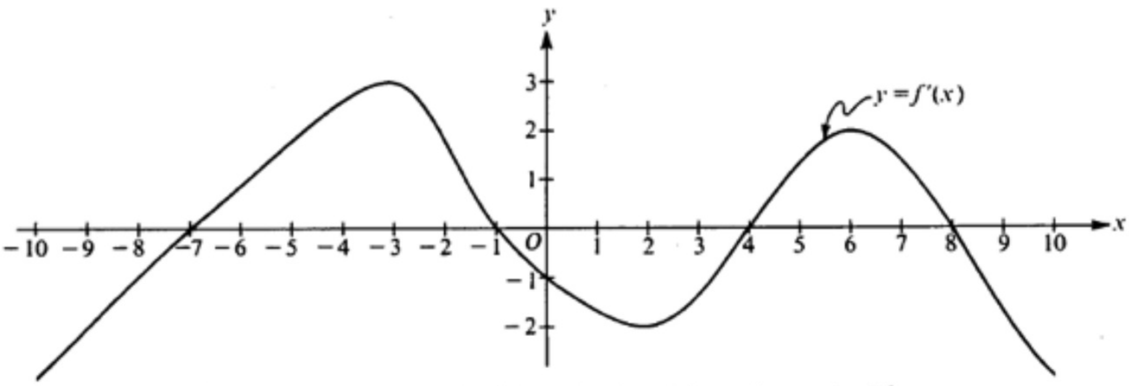
Analyzing derivative graphs

sketching f' and f'' given f

Interpreting Derivative Graphs

HW: worksheet posted on the website

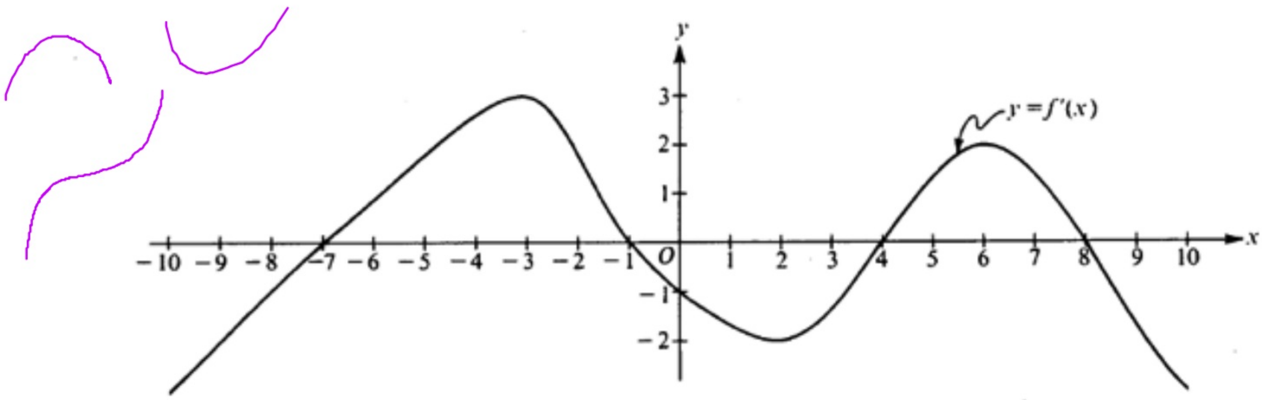
Derivative Graphs WS (second page)



Note: This is the graph of the derivative of f, not the graph of f.

Is f(x) differentiable on the entire interval?

Yes; f'(x) is continuous

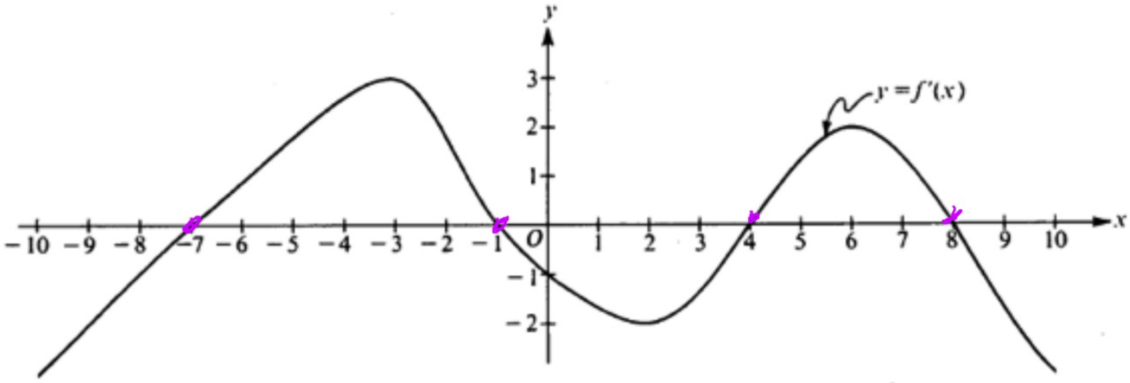


$f'(-7) = 0$

Note: This is the graph of the derivative of f, not the graph of f.

Is f(x) continuous on the entire interval?

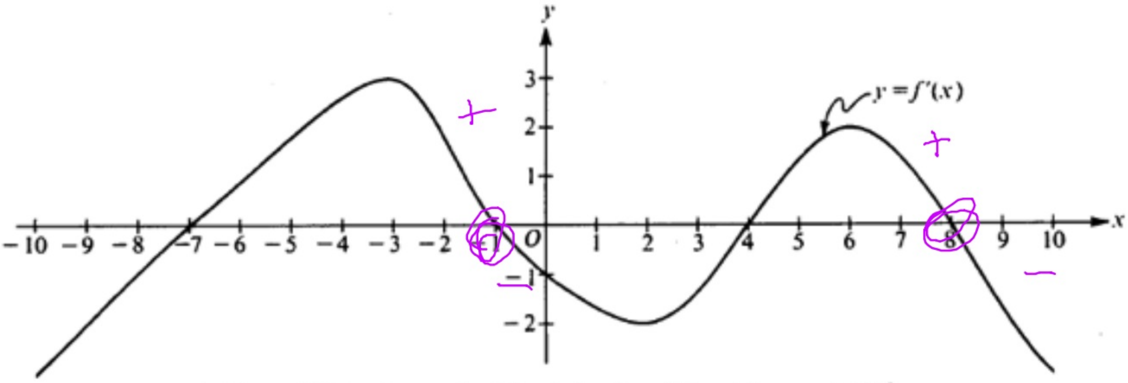
Yes because f'(x) is cotinuous



Note: This is the graph of the derivative of f, not the graph of f.

Where is the derivative zero?

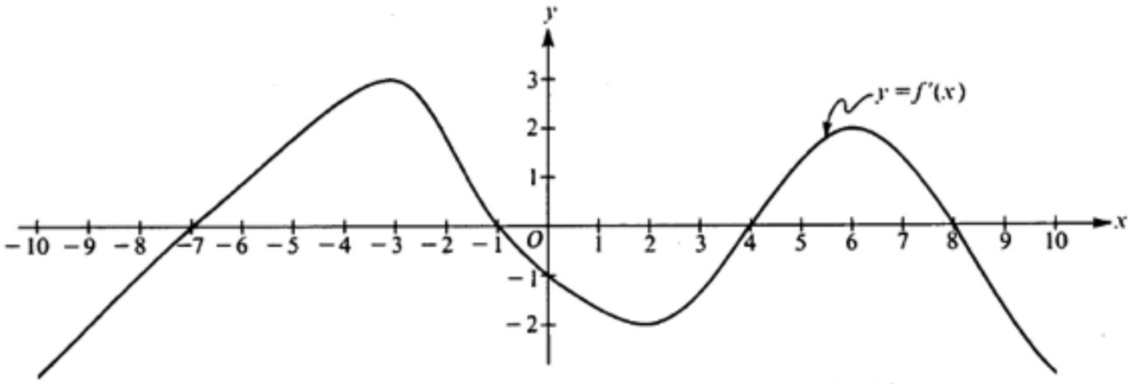
x = -7, -1, 4, and 8 because f'(x) = 0 at these values



Note: This is the graph of the derivative of f, not the graph of f.

Where is there a relative maximum?

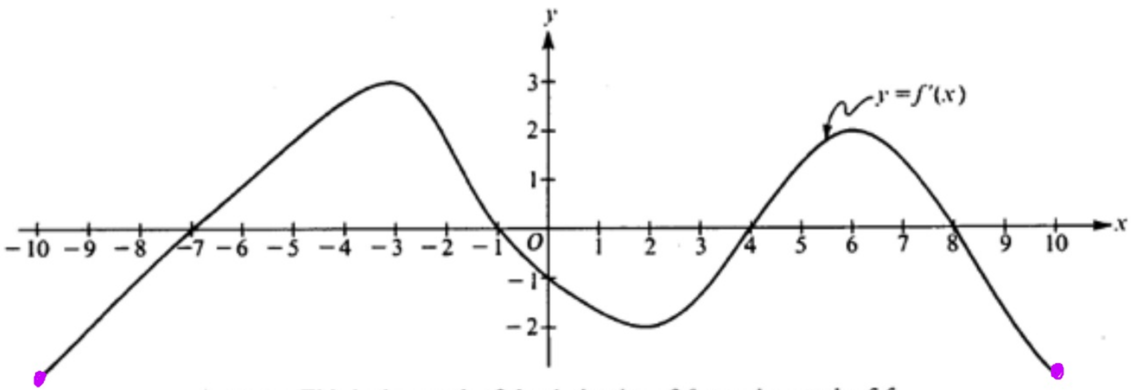
x = -1 and x = 8 because f' changes from positive to negative at these values



Note: This is the graph of the derivative of f, not the graph of f.

Where is there a relative minimum?

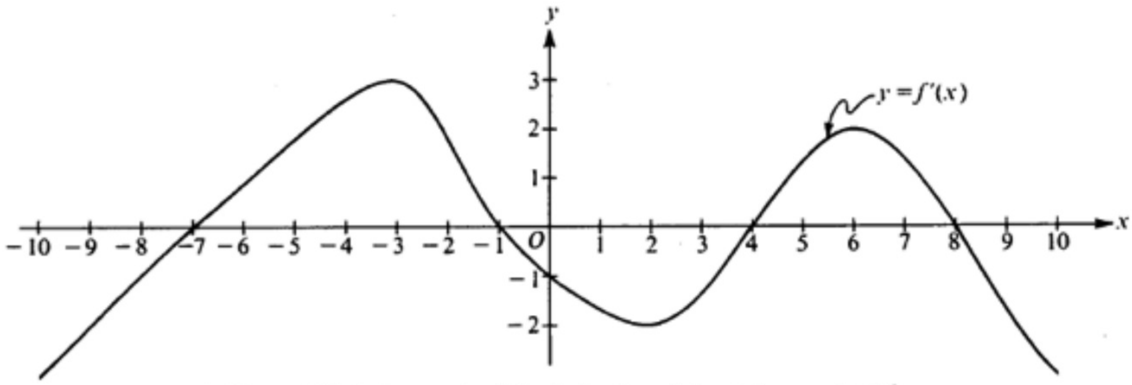
x = -7 and x = 4 because f' changes from negative to positive at these values



Note: This is the graph of the derivative of f, not the graph of f.

Where is f(x) increasing? look for f' > 0

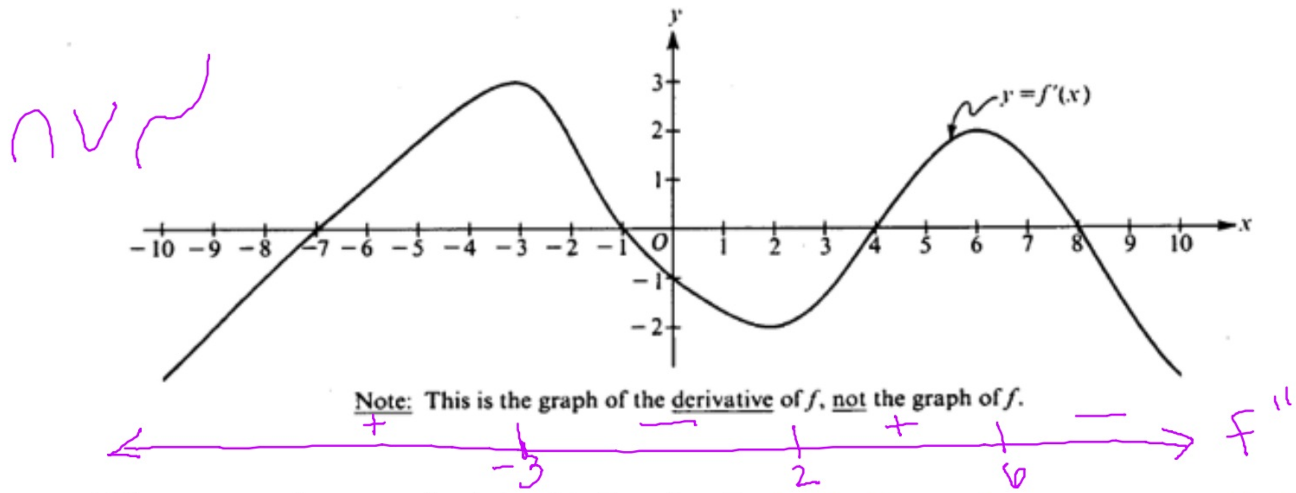
(-7, -1) and (4, 8) because f'>0 on these intervals



Note: This is the graph of the derivative of f, not the graph of f.

Where is f(x) decreasing?

(-10, -7) U (-1, 4) U (8, 10) because f' < 0 on these intervals



Note: This is the graph of the derivative of f, not the graph of f.

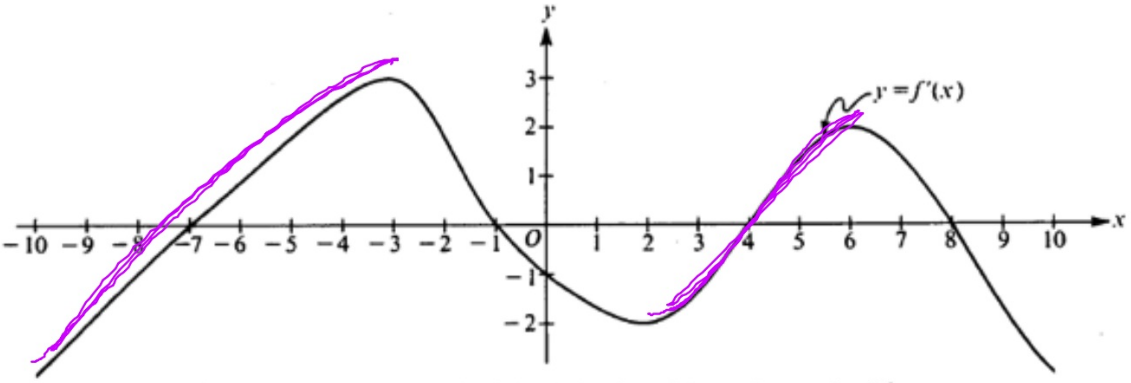
Where are there point(s) of inflection? **look for rel. extrema of f'**

x = -3, 2, and 6 because f' has rel. extrema at these points

because the slope of f' changes signs at these values

OR

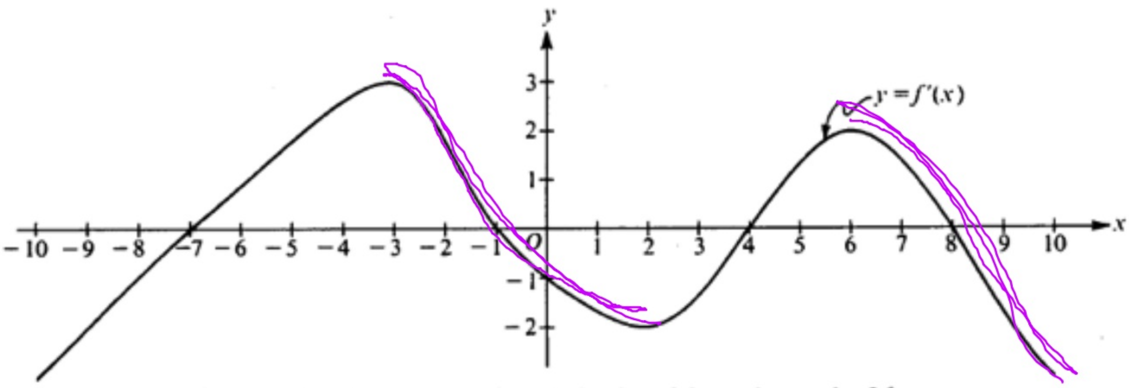
because f' changes from increasing to decreasing or decreasing to increasing at these values



Note: This is the graph of the derivative of f, not the graph of f.

Where is f(x) concave up? look for slope of f' > 0

(-10, -3) U (2, 6) because the slope of f' > 0 OR
f' is increasing on these intervals

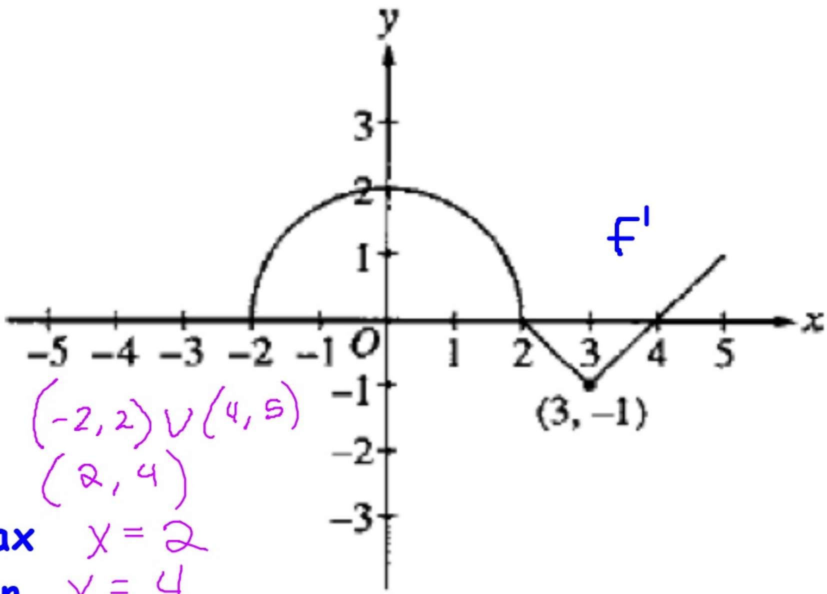


Note: This is the graph of the derivative of f, not the graph of f.

Where is f(x) concave down? **slope of f' is negative**

(-3, 2) and (6, 10) because the slope of f' < 0 on these intervals OR f' is decreasing

[-2, 5]



f incr $(-2,2) \cup (4,5)$

f dec $(2,4)$

rel max $x = 2$

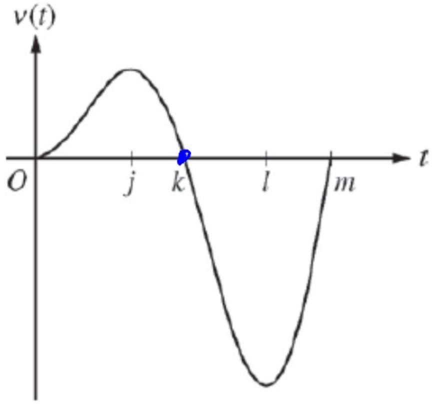
rel min $x = 4$

POI $x = 0, 3$

CCU $(-2,0) \cup (3,5)$

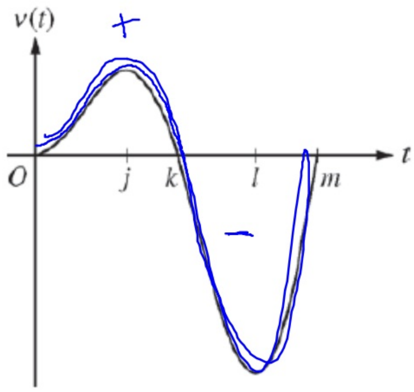
CCD $(0,3)$

(0, m)



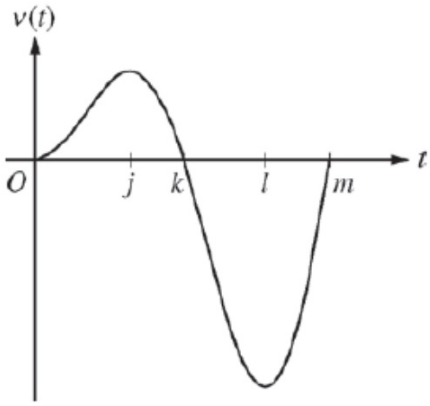
1) State the value(s) of t where the particle is at rest.

t = k



2) State the value(s) of t where the particle is changing direction.

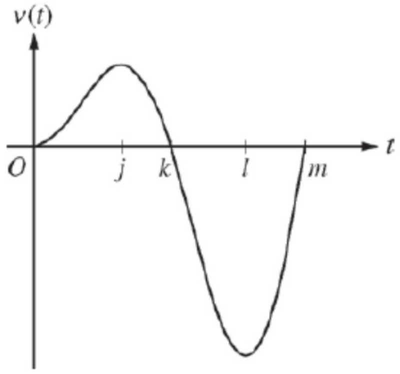
t = K



$v(t) > 0$

3) State the interval(s) where the particle is moving to the right.

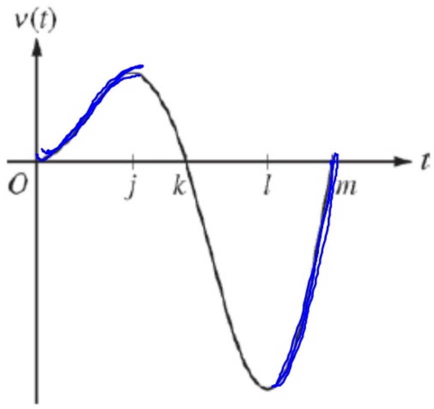
$(0, k)$



$v(t) < 0$

4) State the interval(s) where the particle is moving to the left.

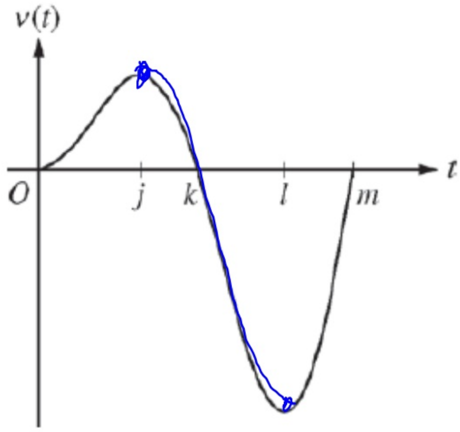
(k, m)



7) State the interval(s) where the velocity is increasing.

$(0, j) \cup (l, m)$

because slope of $v(t) > 0$
$(v'(t))$



8) State the interval(s) where the velocity is decreasing.

(j, l) ; $v'(t) < 0$
or
$a(t)$

$$s(t) = t^3 - \frac{3}{2}t^2 \quad t \geq 0$$

Is the velocity increasing or decreasing at t = 1?

$a(t) = 6t - 3$

$a(1) = 3$

velocity is increasing at t = 1
because a(1) > 0

Is the acceleration increasing or decreasing at t = 1?

$a'(t) = 6$

$a'(1) = 6$

acceleration is increasing at t =1
because a'(1) > 0