

WARMUP

Determine the intervals of concavity and inflection points for

$$f(x) = x^4 - 24x^2 + x - 1$$

Sketch on Graphmatica to confirm.

$f'(x) = 4x^3 - 48x + 1$
 $f''(x) = 12x^2 - 48$
 $0 = 12(x^2 - 4)$
 $0 = 12(x-2)(x+2)$
 $x = -2 \text{ or } x = 2$

	$(-\infty, -2)$	$(-2, 2)$	$(2, \infty)$	$f''(x)$
	-	-	+	+ c.u.
	-	+	-	- c.d.
	+	+	+	+ c.u.

$f(-2) = -83$ Inflection points: $(-2, -83)$; $(2, -79)$
 $f(2) = -79$

Jan 9-1:43 PM

Calculus 120
Unit 4: Applications of Differentiation

April 30, 2019: Day #6

1. Assignment Due on Thursday

Jan 9-1:43 PM

Curriculum Outcomes

C8: Use Calculus techniques to sketch the graph of a function.

C9: Use Calculus techniques to solve optimization problems

C11: Use Calculus techniques to solve problems involving related rates.

Jan 24-9:32 AM

Show that the function $f(x) = x^4$ satisfies $f''(x) = 0$ but has no inflection point.

$f'(x) = 4x^3$
 $f''(x) = 12x^2$
 $0 = 12x^2$
 $x = 0$

	$(-\infty, 0)$	$(0, \infty)$	$f''(x)$
	+	+	c.u.
	+	+	c.u.

No P.O.I., since concavity does not change.

Apr 21-6:59 PM

A function and its first and second derivatives are shown below. Determine the following:

a) intervals of increase and decrease $f(x) = x^3(x+3)^2$

b) any local max and min values $f(x) = \frac{x+1}{x^2(x+3)^2}$

c) intervals of concavity

d) point of inflection $f''(x) = \frac{-2}{x^3(x+3)^3}$

e) sketch a rough graph

a) $f'(x) = \frac{x+1}{x^{1/2}(x+3)^2}$ $f'(x)$ in and out @ $x: 0 \leq x < 3$
 Critical pts: $-3, -1, 0$

x	$x+1$	$x^{1/2}$	$(x+3)^2$	$f'(x)$
$x < -3$	-	+	+	-
$-3 < x < -1$	+	+	+	+
$-1 < x < 0$	+	+	+	+
$0 < x < 3$	+	+	+	+
$x > 3$	+	+	+	+

Local Min: $f(-1) = (-1)^3(2)^2 = -4$
 Local Max: $f(3) = 0$
 Local Min: $(-1, -4)$
 Local Max: $(3, 0)$

c) $f''(x)$ is out @ $x: 0 \leq x < 3$ $f''(x) = \frac{-2}{x^3(x+3)^3}$

x	x^3	$(x+3)^3$	$f''(x)$
$x < -3$	-	+	+
$-3 < x < 0$	+	+	+
$0 < x < 3$	+	+	+
$x > 3$	+	+	+

Point of inflection: $(0, 0)$
 $f(0) = 0$

Apr 21-7:02 PM

Assignment!

Jan 13-9:38 PM



Apr 19-11:22 AM

Attachments

2.1_74_AP.html



2.1_74_AP.swf



2.1_74_AP.html