5.3 Day 3

Tuesday, November 6, 2018 8:34 AM

AP Calculus AB　　　　5.3 Opener　　　　Name ____________________

1. Find the local maximums and minimums of the function. Use the first derivative test. (NO Calculator)

$y = xe^{\frac{1}{x}}$　　$x \neq 0$

$y' = xe^{\frac{1}{x}} \cdot -x^{-2} + e^{\frac{1}{x}}$

$y' = -x^{-1} \cdot e^{\frac{1}{x}} + e^{\frac{1}{x}}$

$y' = e^{\frac{1}{x}}\left(-\frac{1}{x} + 1\right)$

$e^{\frac{1}{x}}\left(-\frac{1}{x} + 1\right) = 0$

$x = 1$

y'　N　|　P
　　　　1

y has a local min @ x=1 b/c y' goes from − to + @ x=1.

2. Find the local maximums and minimums of the function. Use the second derivative test. (NO calculator)

$f(x) = x^3 + 3x^2 - 2$

$f'(x) = 3x^2 + 6x$
$= 3x(x+2)$

$x = 0$　$x = -2$

$f''(x) = 6x + 6$

$f'(0) = 0$　$f'(-2) = 0$

$f''(0) = 6$　$f''(-2) = -6$

$f''(0) > 0$　$f''(-2) < 0$

@ x=0 local min　　x=−2 local max

3. Given $f'(x) = (x+3)^2(x-1)(x-5)$ find: (Calculator ok)

a. Find where all points of inflections occur on $f(x)$.

$x = -3$
$x \approx -.562$
$x \approx 3.562$

f(x) has a p.o.i @ x = −3, −.562, 3.562 b/c f''(x) changes signs at these points.

b. Where all local extrema occur on $f(x)$.

- f(x) has a local max @ x=1 b/c f' goes from + to − @ x=1.
- f(x) has a local min @ x=5 b/c f' goes from − to + @ x=5

c. When $f(x)$ is concave up and justify your answer.

f(x) is ccu $(-3, -.562) \cup (3.562, \infty)$ b/c $f'' > 0$

over the interval.