

Honors Analysis

Name _____

Copy original problem.

Per _____

Date _____

Convince *me* that **you** understand the concept!**No Calculators!**

Chapters 5, 6, & 7 Exam

I Given: $f(x) = \begin{cases} 0 & \text{if } x = 0 \\ x^2 \ln x & \text{if } 0 < x \leq 2 \end{cases}$ (30 pts tot)

- Find the interval(s) where $f(x)$ is decreasing.
- Find the interval(s) where $f(x)$ is concave down.
- Find, identify and verify the coordinates of *all* extrema.
- Find the coordinates of any point(s) of inflection.
- Draw $f(x)$. Be sure to specifically indicate any significant points.

II Given $f(x)$, find $f'(x)$: (5 pts ea)

- a) $f(x) = \cos(e^{3x})$ b) $f(x) = \ln(e^{3x^2})$ c) $f(x) = x^{e^x}$ d) $f(x) = \frac{1}{\ln x}$

III Find the integral: (5 pts ea)

- a) $\int \frac{(3-2x)^3}{x} dx$ b) $\int e^{-3x} dx$

IV Simplify using the “Mumaugh” tables: (5 ps ea)

- a) $\ln 40$ b) $\log_3 8$ c) $\ln(2.4)$ d) $(\log_5 2)(\log_2 25)$

V Find the x -intercept of the line tangent to $f(x) = e^x$ which has slope e^2 . (10 pts)

VI Determine the intervals where $f(x)$ is increasing: $f(x) = \sqrt{\frac{(2x^2 + 1)^3}{(3x^2 - 2)^5}}$ (10 pts)

Extra Credit ----- 5 pts -----

The curve $y = \frac{x^2}{x^2 + 1}$ has two inflection points. They are $(\pm p, q)$. Find the value of: $\frac{1}{p^2} + \frac{1}{q^2}$.