Honors Analysis

Copy the original problem.
Convince *me* that **you** understand the concept.
No calculators, of course.

Name ______________________________

Per ________ Date ______________________

LAST REGULAR EXAM

I

Given: $f(x) = \dfrac{x}{e^x}$; $-2 \le x \le 3$ (tot 35 pts)

a) Find $f'(x)$ in fully simplified form.
b) Find the interval(s) where $f(x)$ is increasing.
c) Find and identify the *coordinates* of all extrema.
d) Find the interval(s) where $f(x)$ is concave down.
e) What is the range of $f(x)$?
f) Sketch $f(x)$.

II

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

a) $f(x) = e^{\cos x}$

b) $f(x) = x^{e^x}$

c) $f(x) = \ln e^{5x}$

d) $f(x) = \ln\left(\dfrac{\sin x}{\cos x}\right)$

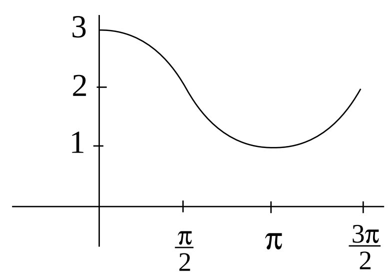
III

Find the x-intercept of the line tangent to $f(x) = e^x$ which has slope 2. (15 pts)

IV

Given $y = \cos x + 2$ graphed on the right. (15 pts)
Find the area trapped below y , above

the x-axis and between $x = \dfrac{\pi}{3}$ and $x = \dfrac{4\pi}{3}$.



V

Jasper says, "Anything to the zero power is 1." (15 pts)

Jed says, "Not so!". Jed writes $y = x^{\frac{1}{\ln x}}$ on the chalkboard and says, "As x gets large, $\ln x$ also gets bigger so $\dfrac{1}{\ln x}$ is certainly positive and is getting closer to zero." He continued, "So we can say $\lim\limits_{x\to\infty} x^{\frac{1}{\ln x}}$ is an example of ∞^0 which is *not* 1."
Explain what Jed meant and show that he was correct.

Extra Credit — 5 pts

How old were you at thirty-four minutes fifty-six seconds past noon on July 8, 1990? What was special about that particular time?