

Prob | Pts

Math 121

Calculus II

Spring 2004

Test #2

Name: _____

Section 1 2 3

Instructor: _____

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This exam is CLOSED NOTES and CLOSED BOOK. There are NO CALCULATORS allowed. To get full credit you must show all work neatly in the space provided on the test paper.

1. (15 pts) Evaluate the following integrals.

a. $\int \sin(x) \cos(x) dx$

b. $\int \frac{x}{\sqrt{1+4x^2}} dx.$

c. $\int \sec x [\sec x + \tan x] dx$

Total

2. (18 pts.) Evaluate the following derivatives.

a. $\frac{d}{dx} \ln \sqrt{2x+1}$

b. $\frac{d}{dx} x^2 \ln(3x-1)$

c. $\frac{d}{dx} \left[\int_1^x \frac{1}{t} dt \right]$

3. (6 pts.) Use the properties of logarithms to write

$$\ln \frac{e^4 x^2}{\sqrt{x+1}}$$

as an equivalent expression in terms of sums and differences of logs in simplest terms.

4. (10 pts.) Indicate for each of the following whether the expression is true or false.

	True	False
$\ln(x) = \frac{1}{x}$	<input type="checkbox"/>	<input type="checkbox"/>

$\ln(25) < \ln(21)$	<input type="checkbox"/>	<input type="checkbox"/>
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$\ln(15) = \ln(3) - \ln(5)$	<input type="checkbox"/>	<input type="checkbox"/>
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$\ln(10) < 10$	<input type="checkbox"/>	<input type="checkbox"/>
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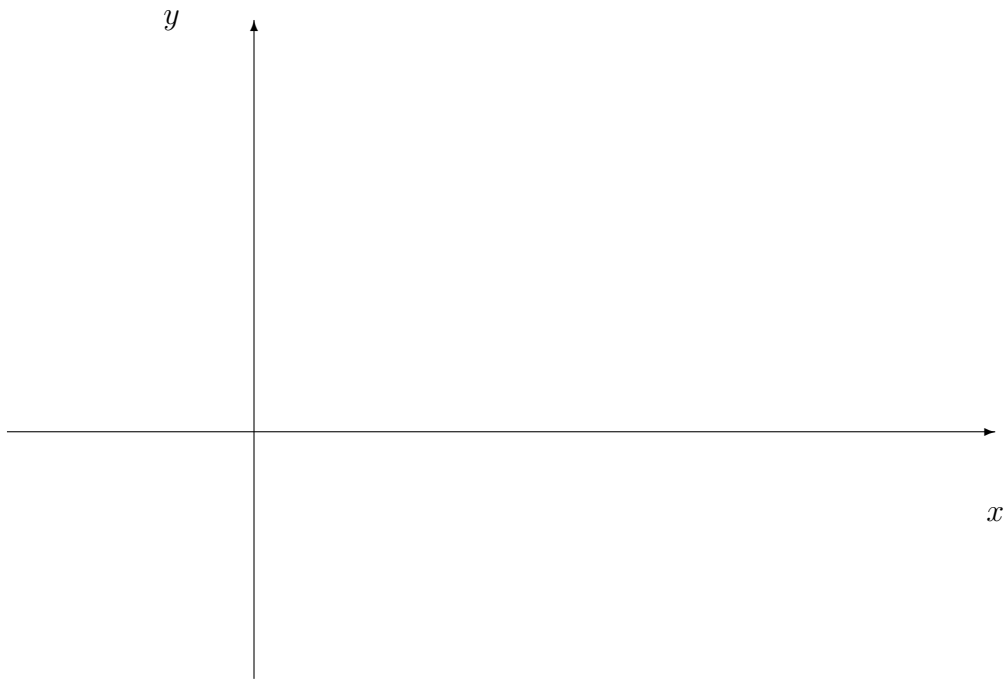
$\ln(3e^2) = 2 + \ln(3)$	<input type="checkbox"/>	<input type="checkbox"/>
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5. (12 pts.) Consider the curve $y = \ln x$, $x > 0$.

a. Find the intervals of x over which y is increasing, and those for which y is decreasing.

b. Find the intervals of x over which y is concave up, and those for which y is concave down.

c. Make a neat sketch of the graph of $y = \ln x$ and label two specific points through which the graph passes.



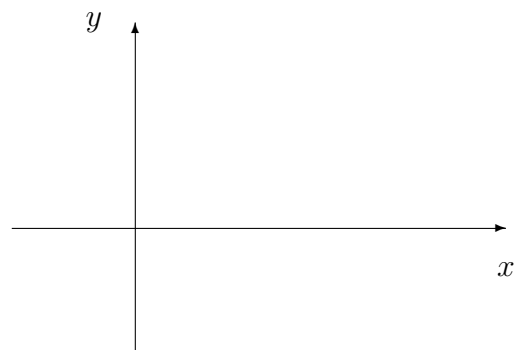
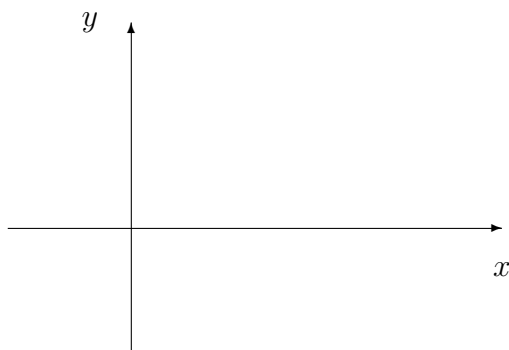
6. (15 pts.) a. Show that the function $f(x) = 2\sqrt{x} - 4$, is one to one.

b. Compute the inverse function of $f(x)$.

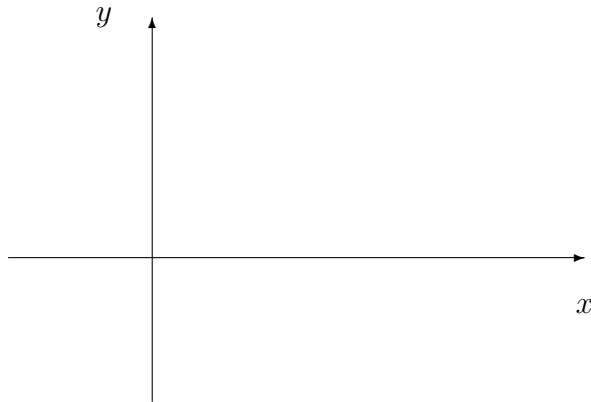
c. What is the domain of the inverse function.

d. On the axes to the left below, draw the graph of any concave down function which has no inverse function.

e. On the axes to the right below draw the graph of any concave down function which does have an inverse function.



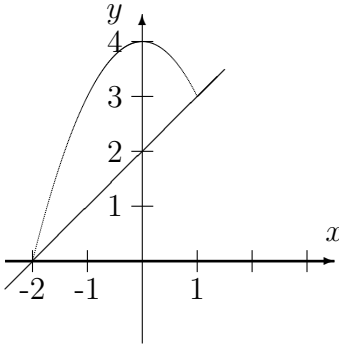
7. (8 pts.) Sketch neatly the three curves $\begin{cases} y = \sqrt{x}, \\ y = -x + 6, \\ y = 1 \end{cases}$ on the axes below, determine their intersection points, and compute the area of the region they bound.



8.(16 pts.) Consider the region sketched below, which is bounded by $y = 4 - x^2$ and $y = 2 + x$. For each of the axes below, set up the integral which gives the volume of rotation about that axis *with respect to x* . In each case determine the shape of the volume element (disk, washer or shell) and indicate its dimensions.

[Both integrals with respect to x . Do NOT evaluate these integrals.]

a. The x -axis:



b. The axis $x = -2$.

