Math 122
Spring 2011
Instructor: Shawn Rafalski

Applied Calculus II
Quiz 4
**Write your name on this quiz**

Sol'n

1. ((a)–(c) are 2 points each) Compute the following indefinite integrals. Do not simplify the answers.

(a) $\int 6x^2\left(2x^3+5\right)^4\,dx = \int u^4\,du = \frac{u^5}{5} + C = \boxed{\frac{(2x^3+5)^5}{5} + C}$

$u = 2x^3+5$
$du = 6x^2\,dx$

(b) $\int 2xe^{x^2}\,dx = \int e^u\,du = e^u + C = \boxed{e^{x^2} + C}$

$u = x^2$
$du = 2x\,dx$

(c) $\int \frac{y}{\sqrt{y^2+4}}\,dy = \int \frac{1}{2}u^{-1/2}\,du = \frac{1}{2}\frac{u^{1/2}}{1/2} + C$

$= \boxed{(y^2+4)^{1/2} + C}$

$u = y^2+4$
$du = 2y\,dy$
$\frac{1}{2}du = y\,dy$

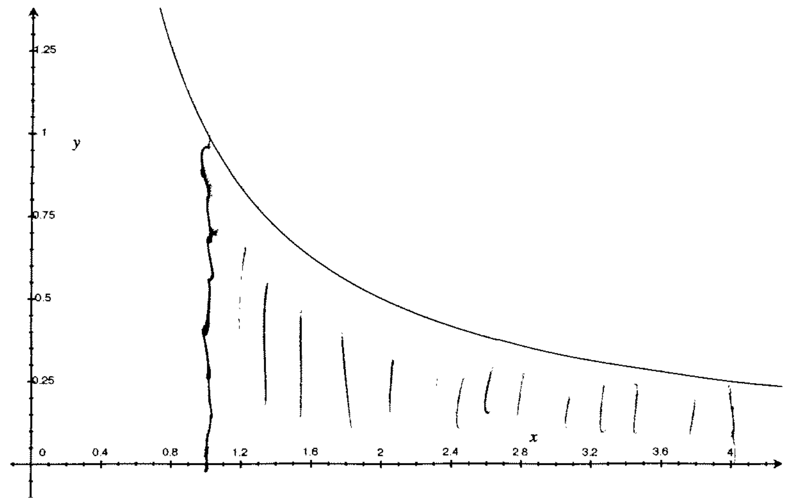
(d) (Bonus 2 points) $\int \frac{\ln x}{x}\,dx = \int u\,du = \frac{u^2}{2} + C = \boxed{\frac{(\ln x)^2}{2} + C}$

$u = \ln x$
$du = \frac{1}{x}\,dx$

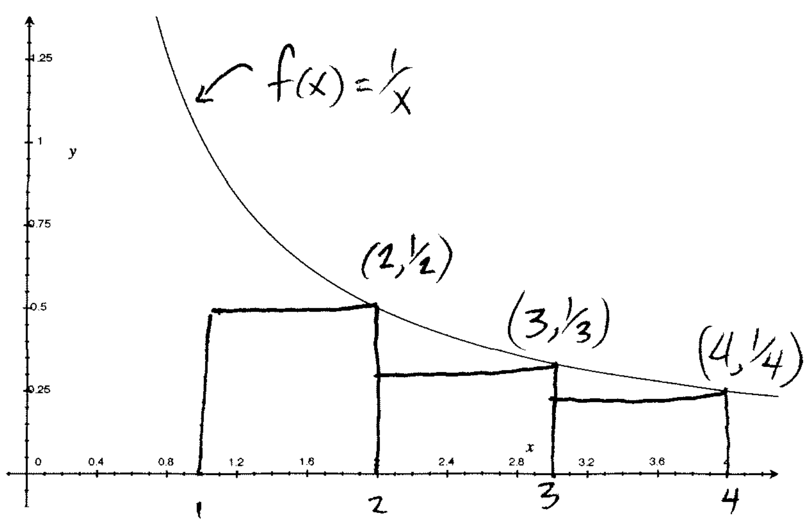
(turn this page over)

2. Each of the figures below depicts part of the graph of the function $\boxed{f(x) = 1/x.}$

(a) (1 point) Indicate the area under the graph from $x = 1$ to $x = 4$ by shading with your pen or pencil.




(b) (2 points) Draw the three *right endpoint* rectangles, all of the same width, that you would use to estimate the area from part (a). Make sure you label the coordinates of the right endpoints of the rectangles you draw.




(c) (1 point) Write down a sum that estimates the area in part (a), using the rectangles you drew in part (b). It is okay to leave your answer written as a sum and NOT add it up.

Area estimate $= 1 \cdot \frac{1}{2} + 1 \cdot \frac{1}{3} + 1 \cdot \frac{1}{4} = \frac{13}{12}$