Math 1B **Review for Test 3 (Sec. 7.8, 8.1 and 8.2)**

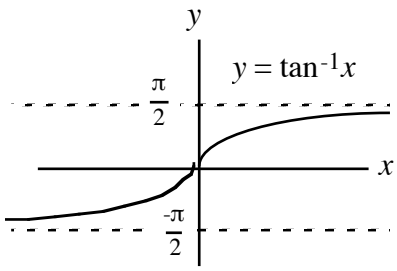
Name _____

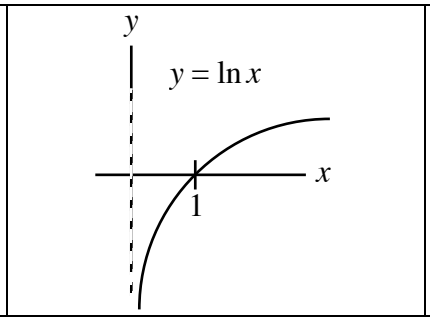
Integrals to be familiar with, but not required for memorization:

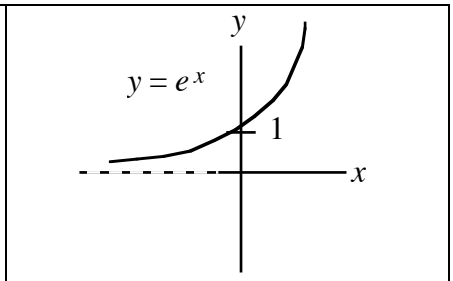
$\int \tan x\ dx = \ln|\sec x| + C$ $\qquad$ $\int \cot x\ dx = \ln|\sin x| + C$

$\int \sec x\ dx = \ln|\sec x + \tan x| + C$ $\qquad$ $\int \csc x\ dx = \ln|\csc x - \cot x| + C$

$\int \frac{1}{x^2 + a^2}\ dx = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C$ $\qquad$ $\int \frac{\sqrt{x^2 + a^2}}{x}\ dx = \sqrt{x^2 + a^2} - a\ln\left|\frac{a + \sqrt{x^2 + a^2}}{x}\right| + C$







Determine whether the improper integral converges or diverges. If it converges, find its value.

1. $\int_e^\infty \frac{1}{x\sqrt{\ln x}}\ dx$

2. $\int_0^\infty \frac{e^x}{e^{2x} + 3}\ dx$

3. $\int_{-\infty}^\infty \frac{1}{x^2 + 9}\ dx$

4. $\int_2^4 \frac{x}{(4 - x^2)^2}\ dx$

5. $\int_{\pi/4}^{\pi/2} \tan x\ dx$

6. $\int_3^4 \frac{1}{x\sqrt{4 - x}}\ dx$

(Updated from original)

Find the arc length of the function on the given interval.

7. $y = \frac{2}{3}(x-1)^{3/2} + 4$, for $2 \le x \le 5$

Set up and simplify—but do not solve—the integral that represents the arc length of the function on the given interval.

8. $y = (x-1)^{1/2}$, for $5 \le x \le 10$

9. $y = \ln(x-1)^2$, for $2 \le x \le 3$ *(Updated from original)*

Find the area of the surface of revolution.

10. $y = \sqrt{e^x + 1}$, for $0 \le x \le \ln 3$, rotated about the x-axis

11. $y = \tan^{-1}x$, for $0 \le x \le 1$, rotated about the y-axis *(Updated from original)*

Set up and simplify—but do not solve—the integral that represents the area of the surface of revolution of the function on the given interval.

12. $y = \ln x$, for $1 \le x \le e$, rotated about the y-axis