Name _____ KEY _____

Instructions: Work the problems below as directed. Show all work. Clearly mark your final answers. Use exact values unless the problem specifically directs you to round. Simplify as much as possible. Partial credit is possible, but solutions without work will not receive full credit.

1. Determine whether the following integrals converge or diverge. If they converge, say what value they converge to.

a. $\int_0^\infty \frac{e^{-x}}{1+e^{-2x}}\,dx$ $\lim\limits_{b\to\infty} \int_0^b \frac{e^{-x}}{1+e^{-2x}}\,dx$

$u = e^{-x}$
$du = -e^{-x}dx$

$\int \frac{-1}{1+u^2}\,du$

$-\lim\limits_{b\to\infty} \arctan e^{-x} + \arctan e^0 =$

$\qquad\qquad 0 \qquad\qquad\qquad \frac{\pi}{4} = \frac{\pi}{4}$

Converges

b. $\int_2^4 \frac{3}{\sqrt{4-x^2}}\,dx$ not defined on this interval

c. $\int_0^1 \frac{1}{x}\,dx$ $\lim\limits_{a\to 0} \ln 1 - \ln a = \infty$ diverges

$\qquad\qquad\qquad 0 \quad -(-\infty)$