

Quiz #9b: Sections 8.3 & 8.4

DO THE FOLLOWING INTEGRALS  
CONVERGE OR DIVERGE?

Once you find your answer, circle the answer to the question. If the integral converges, write the limit in the blank provided. Answers should be exact (not decimal). Show all work to get full credit.

10 pts. 1.  $\int_0^{\pi/2} \tan^2 x \sec^2 x \, dx$

$u = \tan x$

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

$\int u^2 \, du$

$\frac{1}{3} u^3 = \frac{1}{3} \tan^3 x \Big|_0^{\pi/2} = \lim_{x \rightarrow \frac{\pi}{2}} \frac{1}{3} \tan^3 x - \frac{1}{3} \tan^3 0$

$= \infty - 0$

Integral DIVERGES or Integral CONVERGES to \_\_\_\_\_

Don't forget the back!  $\Rightarrow$

10 pts. 2.  $\int_1^{\infty} \frac{dx}{(2x-3)^3}$  Let  $u = 2x-3$

$du = 2 dx$

$\frac{1}{2} \int u^{-3} du$

$\left. \frac{\frac{1}{2} u^{-2}}{-2} = \frac{-1}{4(2x-3)^2} \right]_1^{\infty} = \lim_{x \rightarrow \infty} \frac{-1}{4(2x-3)^2} - \left( \frac{-1}{4(2-3)^2} \right)$

$0 + \frac{1}{4}$

Integral DIVERGES or Integral CONVERGES to  $\frac{1}{4}$

↙ function undefined at  $x=9$

10 pts. 3.  $\int_0^9 \frac{dx}{\sqrt{9-x}}$  Let  $u = 9-x$

$-\int u^{-1/2}$   $du = -dx$

$\left. \frac{-u^{1/2}}{\frac{1}{2}} = -2\sqrt{9-x} \right]_0^9 = \lim_{x \rightarrow 9} -2\sqrt{9-x} + 2\sqrt{9-0}$

$0 + 6$

Integral DIVERGES or Integral CONVERGES to 6

Points earned: \_\_\_\_\_ out of a possible 30 points