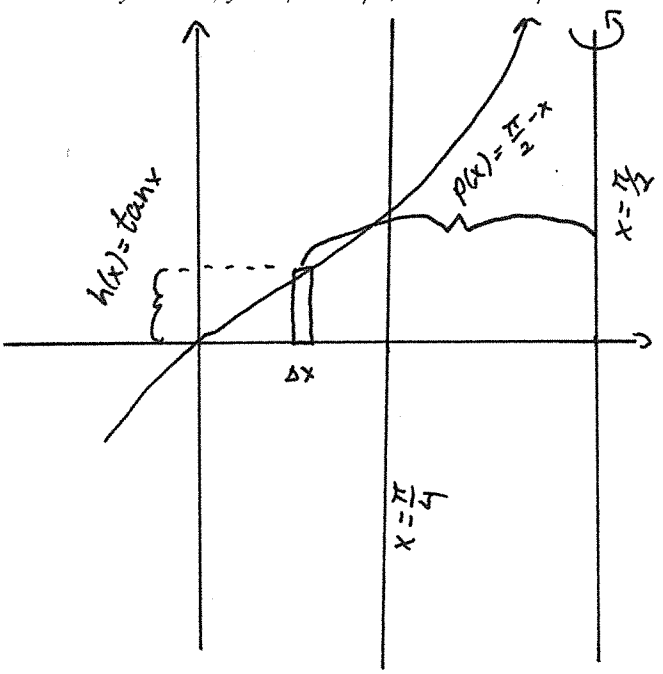
Name: Y. Lamontagne
Student ID: _____

Quiz 10

This quiz is graded out of 10 marks. No books, calculators, notes or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(5 marks)* §7.2 #4 Set up an integral for the volume of the solid obtained by rotating the region bounded by the given curves about the specified axis.

$y = \tan x$, $y = 0$, $x = \pi/4$; about $x = \pi/2$



$$\Delta V = 2\pi p(x) h(x) \Delta x$$
$$= 2\pi \left(\frac{\pi}{2} - x\right) \tan x \, \Delta x$$

$$V = \int_0^{\pi/4} 2\pi \left(\frac{\pi}{2} - x\right) \tan x \, dx$$

Question 2. *(5 marks)* §7.2 #11 Find the exact length of the curve

$y = \ln(\sec x)$, $0 \le x \le \frac{\pi}{4}$

$$y' = \frac{1}{\sec x} \sec x \tan x = \tan x$$

$$S = \int_a^b \sqrt{1 + (y')^2} \, dx$$
$$= \int_0^{\pi/4} \sqrt{1 + \tan^2 x} \, dx$$
$$= \int_0^{\pi/4} \sqrt{\sec^2 x} \, dx$$
$$= \int_0^{\pi/4} |\sec x| \, dx$$

$$= \int_0^{\pi/4} \sec x \, dx \quad \text{since } \sec x > 0 \text{ on } [0, \tfrac{\pi}{4}]$$
$$= \left[\ln|\sec x + \tan x|\right]_0^{\pi/4}$$
$$= \ln\left|\sec\tfrac{\pi}{4} + \tan\tfrac{\pi}{4}\right| - \ln|\sec 0 - \tan 0|$$
$$= \ln|\sqrt{2} + 1|$$