

Serial No.: \_\_\_\_\_ Student Name: \_\_\_\_\_ Student Number: \_\_\_\_\_  
Instructor: M. Z. Abu-Sbeih Math 101- Q4 Date: 10-8-2014

---

**Show all your work. No credits for answers not supported by work.**

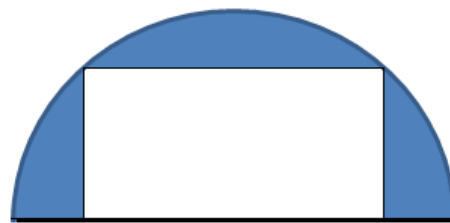
**Problem 1: (14 points)** Evaluate the limit if it exists

(a)  $\lim_{x \rightarrow \infty} x \left( \frac{\pi}{4} - \tan^{-1} x \right)$

(b)  $\lim_{x \rightarrow 0^+} (1 + \sin x)^{1/x}$

**Problem 2: (7 points)** Use Newton's method to find the next approximate solution ( $x_1$ ) to the equation  $x - 1 = \sqrt{x}$  by starting with  $x_0 = 4$ .

**Problem 3: (7 points)** Determine the dimension of the rectangle with largest area that can be inscribed in a semicircle of radius 6.



**Problem 4: (12 points)** Evaluate each of the following integrals

(a)  $\int \left(x + \frac{1}{x}\right)^2 dx$

(b)  $\int (2^x - \csc^2 x) dx$