Math 182 Quiz 2 Version A

1. A window is in the form of a rectangle surmounted by a semicircle. The rectangle is of clear glass, wheras the semicircle is of tinted glass that transmits only half as much light per unit area as the clear glass does. The total perimeter is fixed.



Find the proportions of the window that will admit the most light. Neglect the thickness of the frame.

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2. State the Mean Value Theorem (for derivatives).

3. State the definition of $\ln x$ in terms of an integral.

4. Use the above definition of logarithm to show that $\ln a + \ln b = \ln ab$.

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5. Solve the following indefinite integrals:

(i)
$$\int \sqrt{\frac{x-1}{x^5}} \, dx$$

(ii)
$$\int \frac{\ln x^2}{x} \, dx$$

(iii)
$$\int \sin^3 x \, dx$$

(iv)
$$\int \ln(2x+1) \, dx$$

6. Find the volume of the solid generated by revolving the region bounded by $y=2\sqrt{x}$, y=2 and x=0 about the x-axis.

7. Find the volume of the solid generated by revolving the the shaded region about the y-axis.

