

Name:

Monday, May 6th, 2014

Id:

Exam#1

Math IB

- Please show all your work step by step clearly, and underline or circle your final answer.
- No graphic calculators are allowed.

1) a) Estimate the area under the graph of $f(x) = \frac{1}{x}$ from $x=1$ and $x=5$ using four approximating rectangles and right end points.

b) Sketch the graph and rectangles.

c) Is your estimate an under estimate or over estimate? Why?

2) **Use the definition of definite integral** to calculate the value of the following integral

$$\int_0^4 (x^2 - 3x) dx .$$

3) Use the comparison properties of integrals to **estimate** $\int_{-1}^1 \sqrt{1+x^4} dx$.

4) If $w'(t)$ is the rate of growth of a child in pounds per year what does

$$\int_5^{10} w'(t) dt \text{ represent?}$$

5) a) State the Fundamental Theorem of Calculus Part I.

b) Use Part I of Fundamental Theorem of Calculus to find the derivative of the function $y = \int_{\tan x}^{17} \sin(t^4) dt$

6) Find the integral of the following

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

b) $\int_0^{\pi} x \cos(x^2) dx$

7) Given the functions $x = 2y^2$ and $x = 4 + y^2$.

a) Sketch the graph of the region enclosed by the given curves.

b) Find the area of the region enclosed by the given curves.

8) Given $y = 1 - x^2$, $y = 0$

a) Sketch the region, the solid, and a typical disk.

b) Find the volume of the solid obtained by rotating the region bounded by the given curves about the x-axis.

9) Prove the following:

Suppose f is continuous on $[-a, a]$, If f is even [$f(-x) = f(x)$], then

$$\int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx .$$