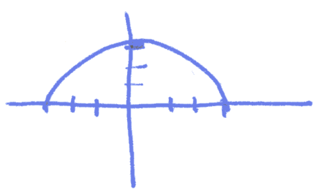
Math 131, Spring 2004
The Last One!, Discussion Section A (Thursday, 11:00-12:00)

Quiz problems should be solved using the methods discussed in this course. A calculator is not permitted. To receive full credit, show enough work to make it clear how you got your answer.

Name: Answer Key ID# __________

1. Evaluate $\int_0^3 \sqrt{9-x^2}\,dx$ by interpreting the integral in terms of areas.



So $\int_0^3 \sqrt{9-x^2}\,dx$ is equal $\frac{1}{4}$ the area of a circle with radius 3.

ie $\int_0^3 \sqrt{9-x^2}\,dx = \frac{1}{4}\pi 3^2 = \frac{9}{4}\pi$

2. Find the general indefinite integral: $\int \frac{(x-1)(2+x^2)}{x}\,dx$.

$$\int \frac{(x-1)(2+x^2)}{x}\,dx = \int \frac{2x+x^3-2-x^2}{x}\,dx$$

$$= \int \left(2+x^2-\frac{2}{x}-x\right)dx$$

$$= \int 2\,dx + \int x^2\,dx - 2\int \frac{1}{x}\,dx - \int x\,dx$$

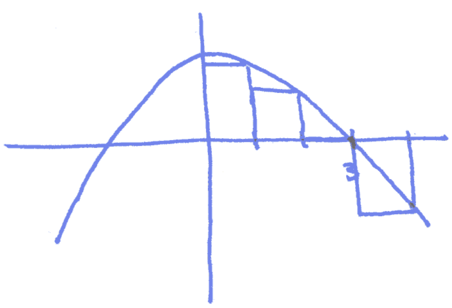
$$= 2x + \frac{x^3}{3} - 2\ln x - \frac{x^2}{2} + C$$

Math 131, Spring 2004
The Last One!, Discussion Section B (Tuesday, 12:00-1:00)

Quiz problems should be solved using the methods discussed in this course. A calculator is not permitted. To receive full credit, show enough work to make it clear how you got your answer.

Name: Answer Key ID# ____________

1. Estimate the area under the graph of $f(x) = 9 - x^2$ from $x = 0$ to $x = 4$ using four approximating rectangles with right endpoints. Sketch the graph and the rectangles.



$f(x) = 9 - x^2$

$\Delta x = \frac{b-a}{n} = \frac{4-0}{4} = 1$

$R_4 = \sum_{i=1}^{4} f(x_i)\Delta x$

$= f(1)\cdot 1 + f(2)\cdot 1 + f(3)\cdot 1 + f(4)\cdot 1$

$= 8 + 5 + 0 - 7$

$= 6$

2. (a) (one point) Express $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{2\pi}{n}\right) \sin\left(\frac{2\pi i}{n}\right)$ as a definite integral.

$\Delta x = \frac{b-a}{n} = \frac{2\pi}{n}$ so choose $b = 2\pi$, $a = 0$

Then $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{2\pi}{n}\right) \sin\left(\frac{2\pi i}{n}\right) = \int_0^{2\pi} \sin x \, dx$

b) (two points) Find $\int_2^3 f(x)\,dx$ if $\int_0^5 f(x)\,dx = 10$, $\int_2^0 f(x)\,dx = 2$, and $\int_3^5 2f(x)\,dx = 8$. Remember to show your work.

First note $\int_3^5 2f(x)dx = 8 \Rightarrow \int_3^5 f(x)dx = 4$

Now $\int_0^5 f(x)dx = \int_0^2 f(x)dx + \int_2^3 f(x)dx + \int_3^5 f(x)dx$

$\Rightarrow \quad 10 = -2 + \int_2^3 f(x)dx + 4$

$\Rightarrow \quad 8 = \int_2^3 f(x)dx.$

Math 131, Spring 2004
The Last One!, Discussion Section C (Thursday, 12:00-1:00)

Quiz problems should be solved using the methods discussed in this course. A calculator is not permitted. To receive full credit, show enough work to make it clear how you got your answer.

Name: Answer Key ID# ____________

1. (a) (one point) Express $\lim_{n\to\infty} \sum_{i=1}^{n} \left(\frac{2\pi}{n}\right) \cos\left(\frac{2\pi i}{n}\right)$ as a definite integral.

$$\int_0^{2\pi} \cos x\,dx$$

b) (two points) Find $\int_2^3 f(x)\,dx$ if $\int_0^5 f(x)\,dx = 8$, $\int_2^0 f(x)\,dx = 1$, and $\int_3^5 2f(x)\,dx = 10$. Remember to show your work.

$$\int_0^5 f(x)dx = \int_0^2 f(x)dx + \int_2^3 f(x)dx + \int_3^5 f(x)dx$$

$$\Rightarrow \int_0^5 f(x)dx = -\int_2^0 f(x)dx + \int_2^3 f(x)dx + \frac{1}{2}\int_3^5 2f(x)dx$$

$$\Rightarrow \quad 8 = -1 + \int_2^3 f(x)dx + 5 \Rightarrow \int_2^3 f(x)dx = 4$$

2. Evaluate $\int \left(\frac{1}{x} + 2\sec^2 x + \frac{1}{x^2} + 4e^x\right) dx$.

$$\int \left(\frac{1}{x} + 2\sec^2 x + \frac{1}{x^2} + 4e^x\right) dx =$$

$$\int \frac{1}{x}dx + 2\int \sec^2 x\,dx + \int \frac{1}{x^2}dx + 4\int e^x dx =$$

$$\ln x + 2\tan x - \frac{1}{x} + 4e^x + C.$$