MATH 131
Quiz IV II
December 1, 1989

$\bar{x}$ 18.6/30
med 19

Name Key

time OK
allowed xtra
just @ 18
med @ 29

(18) 1. Find the following integrals:

a. $\int_1^4 \frac{x}{\sqrt{x^2+3}}\,dx = \frac{1}{2}\int_4^{19} u^{-1/2}\,du = \frac{1}{2}\,\frac{u^{1/2}}{1/2}\Big|_4^{19} = \sqrt{19}-\sqrt{4}$ 1/2

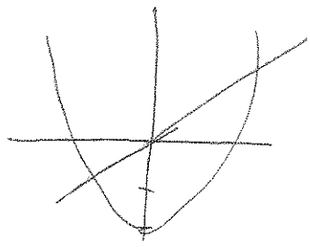
$u = x^2+3$
$du = 2x\,dx$
$x=1 \quad u=4$
$x=4 \quad u=19$

b. $\int x\sqrt{x-1}\,dx = \int (u+1)\sqrt{u}\,du = \int u^{3/2}+u^{1/2}\,du$

$u = x-1$
$x = u+1$
$du = dx$

$= \frac{u^{5/2}}{5/2} + \frac{u^{3/2}}{3/2} + C = \frac{2}{5}(x-1)^{5/2} + \frac{2}{3}(x-1)^{3/2} + C$ 1/2

(6) 2. Find the area of the region bounded by the curves $y = x^2 - 2$ and $y = x$.



many did volume

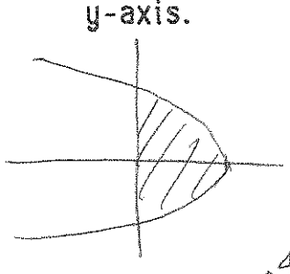
$x^2-2 = x$
$x^2-x-2=0$
$(x-2)(x+1)=0$
$x = -1, 2$

$\int_{-1}^{2} x-(x^2-2)\,dx$ 1/2

$= \int_{-1}^{2} -x^2+x+2\,dx = -\frac{x^3}{3}+\frac{x^2}{2}+2x\Big|_{-1}^{2}$

$= -8/3 + \frac{4}{2} + 4 - \left(-\frac{1}{3}+\frac{1}{2}-2\right) = \frac{-8}{3}+6$
$4\ 2-\frac{1}{2}-\frac{1}{3}$
$-3+8-\frac{1}{2}$
$4\frac{1}{2}$

(6) 3. Find the area of the region bounded by the curve $x + y^2 = 4$ and the y-axis.



$x = -y^2+4$

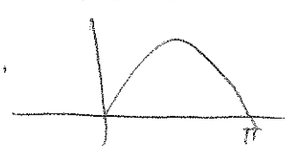
$\int_{-2}^{2} -y^2+4\,dx = -\frac{y^3}{3}+4y\Big|_{-2}^{2} = -\frac{8}{3}+8 - \left(-\frac{8}{3}-8\right)$

$= \frac{32}{3}$ 1/2

or $2\int_0^4 \sqrt{4-x}$ bad... $-2\frac{(4-x)^{3/2}}{3/2}\Big|_0^4$

$= -\frac{4}{3}(0) + \frac{4}{3}(4)^{3/2} = \frac{32}{3}$

6 3. (Set up only!)
a. Find the volume of the solid formed by rotating about the y-axis the region bounded by $y = \sin x$ and the x-axis for $0 \le x \le \pi$.
b. What is the volume if a hole of radius 1 is removed from the center?

a. 

$\int_0^{\pi} 2\pi x \sin x\,dx$ 1/3

b. $\int_1^{\pi} 2\pi x \sin x\,dx$ 1/3 did x axis

of solid