MATH 131
Quiz X
December 4, 1992

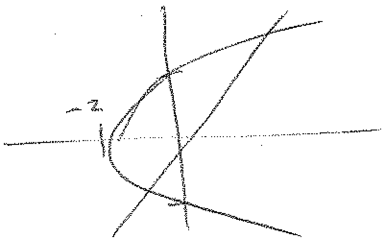
allowed 29 in
15 present

Name Key

First left @ 17
First songs quy 21
1/2 24 in

Total: 2 tests and best 5 quizzes:______

10 1. Find the area bounded by the curves $x = y^2 - 2$ and $y = x$.



$y^2 - 2 = y$

$y^2 - y - 2 = 0$

$(y-2)(y+1) = 0$

$y = -1, 2$

$\int_{-1}^{2} y - (y^2 - 2)\, dy$ 2

$= \int_{-1}^{2} y - y^2 + 2\, dy$

$= \frac{y^2}{2} - \frac{y^3}{3} + 2y \Big|_{-1}^{2} = \frac{4}{2} - \frac{8}{3} + 4 - \left(\frac{1}{2} + \frac{1}{3} - 2\right)$

$= 6 - \frac{8}{3} + 2 - \frac{1}{2} - \frac{1}{3}$

$= 8 - 3 - \frac{1}{2} = 4\frac{1}{2}$

$= \frac{9}{2}$

10 2. A force of 10 lbs. is required to hold a spring extended 3 in. How much work is done in pulling the spring from rest to an extention of 5 in.?

$F(x) = kx$

$F(3) = 10$

$k \cdot 3 = 10$

$k = \frac{10}{3}$

$F(x) = \frac{10}{3} x$

$W = \int_0^5 \frac{10}{3} x\, dx = \frac{10}{3} \frac{x^2}{2} \Big|_0^5$

$= \frac{5}{3}(25) - 0 = \frac{125}{3}$ in-lbs

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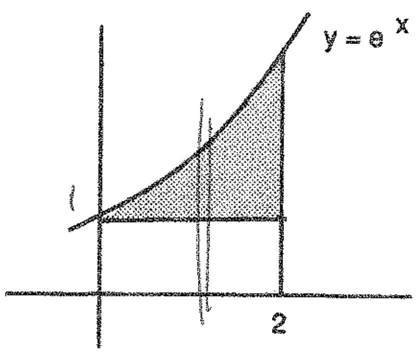
10 3. Find the volume of the solid generated by revolving the region shown about the x-axis.



$\int_0^2 \pi (e^x)^2 - \pi (1)^2\, dx$

$= \int_0^2 \pi e^{2x} - \pi\, dx$

$= \frac{\pi e^{2x}}{2} - \pi x \Big|_0^2$

$= \frac{\pi}{2} e^4 - 2\pi - \left(\frac{\pi}{2} e^0\right)$

$= \frac{\pi}{2} e^4 - \frac{5}{2}\pi = \frac{\pi}{2}(e^4 - 5)$

10 4. Find the volume of the solid generated by revolving the above region about the line $y = 1$.

$\int_0^2 \pi (e^x - 1)^2\, dx = \pi \int_0^2 e^{2x} - 2e^x + 1\, dx$

take best 3

$= \pi \left(\frac{e^{2x}}{2} - 2e^x + x\right) \Big|_0^2$

$= \pi\left(\frac{e^4}{2} - 2e^2 + 2\right) - \pi\left(\frac{e^0}{2} - 2e^0 + 0\right)$

$= \pi \left[\frac{e^4}{2} - 2e^2 + 2 - \frac{1}{2} + 2\right]$

$= \pi \left[\frac{e^4}{2} - 2e^2 + \frac{7}{2}\right]$