

practice

How would you find:

- $\int_{-1}^1 x^2 \sin^{-1} x \, dx$

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

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

1. arcsin is odd, x^2 is even, so the product is odd, so the integral is zero.
2. Let $u=1-x^2$. Then do $v=\sqrt{u}$
Answer = $-\ln|\sqrt{1-x^2}+1|+C$
(Stewart 7.5.39)
3. Let $u=e^x$, then do partial fractions.
Answer = $1/3 \ln|2e^x - 1|$
 $- 1/3 \ln|e^x + 1| + C$
(Stewart 7.5.68)

today:

§ 8.2 - surface area

quiz iv: §§ 4.4, 7.4

homework 6 due (4.4.28, 4.4.40, 4.4.58, 7.8.26, 7.8.36, 7.8.40)

monday:

webwork extra credit ii help session in EA 265 @ 5:30 pm

exam iii review in HI 131 @ 7:30 pm

tuesday:

homework 7 due (8.1.6, 8.1.16, 8.1.34, 8.2.12, 8.2.14, 8.2.26)

review for midterm iii

thursday, 19 november:

midterm iii: §§ 4.4, 7.4, 7.8, 8.1, 8.2

§ 9.1 - modeling with differential equations

friday, 20 november:

webwork homework vi due at 11:55 pm

monday, 23 november:

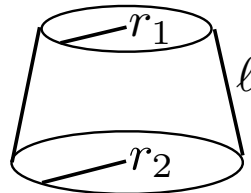
webwork extra credit ii due @ 6:00 am

surface area

The surface area of a frustum of a cone with radii r_1 and r_2 , and length of slant ℓ is

$$S = \pi (r_1 + r_2) \ell$$

If we split up the surface of a solid of revolution into infinitely many pieces, we get frustums, each one of which has $L=ds$, $r_1=r_2$, so when we integrate to combine them all, we get the surface area formula.



surface area

Suppose f is positive and has continuous derivative on $[a, b]$. Then the **surface area** of the surface obtained by rotating $y=f(x)$, $a \leq x \leq b$ about the x -axis is

$$S = \int_a^b 2\pi f(x) \sqrt{1 + (f'(x))^2} dx$$

As with arc length, we can find the surface area of the surface obtained by rotating $x=g(y)$, $c \leq y \leq d$ by replacing the $f(x)$, $f'(x)$, and dx with $g(y)$, $g'(y)$, and dy respectively (and integrating from c to d)

example

Find the surface area formed by rotating

$$y = \sqrt{16 - x^2}$$

$0 \leq x \leq 4$ about the x -axis.

32π
(Surface area of half of
sphere of radius 4)

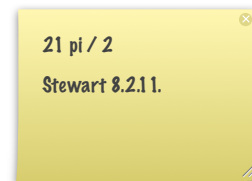
example

The parabola $y=x^2$ from $x=1$ to $x=2$ is rotated about the y axis. Find the surface area.

$\pi/6 * (17^{3/2} - 5^{3/2})$
Stewart's example
8.2.2.

example

$x = \frac{1}{3}(y^2 + 2)^{3/2}, 1 \leq y \leq 2$ is rotated about the x axis. Find the surface area.



coming soon

- extra credit project 2 help session on monday (due 23 november @ 6 am)
- mslc midterm iii review on monday
- review on tuesday; come with questions!
- homework 7 due tuesday
- midterm iii on thursday