

MIS1
CH. 9: REVIEW

$$\int f(x) dx$$

MISO

① Basic?

$$\int \frac{1}{\sqrt{1-x^2}} dx = \sin^{-1} x + C \quad (\text{POP QUIZ!})$$

$$\int \frac{1}{2x+1} dx = \frac{1}{2} \ln |2x+1| + C$$

Guess-and-✓
Use sparingly!

② Basic Manip.

$$\int \frac{x+1}{x^3} dx$$

Trig: $\rightarrow \sin, \cos$ (like
IPs (Pyth.))

③ u-sub

$\rightarrow x$ at end

(9.6) $u = [\text{esp. linear}] g(x)$ or $\sqrt[n]{g(x)}$, $u = x^{\frac{1}{n}}$
Solve for x (or x^n).

MIS1 (I May Mix Up the Order on the Test!)

④ $\int$ by Parts

$$\int \underbrace{(\text{Easy to } D_x)}_u \underbrace{(\text{Easy to } I)}_{dv}$$

$$\frac{u}{du} \cdot \frac{dv}{dv}$$

$$\int \underbrace{\ln x}_u \underbrace{dx}_{dv}$$

$\leftarrow \int (\text{elementary func.}) - \text{what else would you do?}$

I may forbid this
on other problems,
even though it may
work well! See
the web article (pp. 2-3).

Repeat? Reduction formulas. **TURBO METHOD!**

$$\text{If } I = \text{---} + \frac{1}{2} I$$

$$\frac{2}{3} I = \text{---} + C$$

$$I = \frac{3}{2} (\text{---}) + C$$

(5) Trig Is

MISO ($\rightarrow$ m, cos; 10s ; u-sub)

$$\text{Want: } \int \sin^{(m)} x \cos^{(n)} x dx$$

If m, n even $\Rightarrow$ PRIs:

$$\sin^2 x = \frac{1 - \cos(2x)}{2}$$

$$\cos^2 x = \frac{1 + \cos(2x)}{2}$$

$$\int \tan^{(m)} x \sec^{(n)} x dx \quad \begin{matrix} \text{odd or even} \\ \text{Good!} \\ \text{Guy} \\ \text{but} \end{matrix}$$

Let $u = \text{"other guy"}$

$$du = \text{---} dx$$

($\Rightarrow$) peel

Use Pyth. ID to make "u"s.

$$\int \tan^{\text{even}} x dx : \text{Peel } \tan^2 x, \text{ Pyth ID}$$

$$\int \sec^{\text{odd}} x dx : \text{Parts}$$

⑥ Trig Subs

$$\begin{array}{ll} \sqrt{9-x^2} & x=3\sin\theta \quad \text{Don't forget! } dx=... \quad (\text{Really, } \theta = \sin^{-1}(\frac{x}{3}), |x| \leq 3) \\ \sqrt{9-4x^2} & 2x=3\sin\theta \\ \sqrt{\frac{x^2+9}{(2x)^2}} & \\ \sqrt{x^2+9} \text{ (or } \sqrt{x^2-9}) & x=3\tan\theta \\ & x=3\sec\theta \end{array}$$

Use R_yth ID

→ x

 $\sin^{-1}, \dots ?$

△ Missing side should be familiar!

⑦ PFDs

$$\int \frac{N(x)}{D(x)} dx \quad (\text{Avoid PFDs if see } \sqrt{\text{stuff in } x})$$

rat'l (maybe after a sub!) Try ⑥ or ⑧?

Improper ⇒ Long ÷

$$\frac{N(x)}{\text{factored } D(x)} = p \text{ + d form}$$

Fair question!

• thru

Find A, B, ...

Expand or

Pick x-values (Do 1st, then 5?)

$$\left(\frac{A}{x-1}, \frac{Bx+C}{x^2+16}, \text{ run up to } ()^n \right)$$

irred. quadratic

+K at end

⑧ CTS $\int \frac{1}{\sqrt{x^2+6x+10}} dx$ u- or Trig sub?

⑨ $\int (\text{rat'l in } \sin x, \cos x) dx$ $u = \tan(\frac{x}{2})$

⑩ Table of $\int$ s (AZ1) (9.7-not tested)

Start on cheat sheet for final?