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36 e

38 d

40 f

50 b

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45, 41, ~~49~~, 65

41 $\frac{dy}{dx} = x - 1$, $(1,2)$, $\Delta x = 0.1$

$(1.3, ?)$

$x_{new} = x_{old} + \Delta x$

$y_{new} = y_{old} + \frac{dy}{\cancel{dx}}\Big|_{old} \cdot \cancel{\Delta x}$

(x,y)	$\frac{dy}{dx}$	Δx	$\frac{dy}{dx} \cdot \Delta x$	
$(1,2)$	$1-1=0$	0.1	$0 \cdot 0.1 = 0$	$(1.1, 2)$
$(1.1, 2)$	$1.1-1=0.1$	0.1	$(0.1)(0.1) = 0.01$	$(1.2, 2.01)$
$(1.2, 2.01)$	$1.2-1=0.2$	0.1	$(0.2)(0.1) = 0.02$	$(1.3, 2.03)$
$(1.3, 2.03)$				

65 $\int \frac{dy}{dx} = \int x - \frac{1}{x^2}$ x^{-2} $y(1) = 2$

$y = \frac{x^2}{2} + \frac{1}{x} + C \rightarrow y = \frac{x^2}{2} + \frac{1}{x} + \frac{1}{2}$,

$x > 0$

$2 = \frac{1^2}{2} + \frac{1}{1} + C$

$\frac{1}{2} = C$

p 338

(18) $\frac{1}{4}\sin(2x^2)+C$

(20) $(7x-2)^4+C$

(22) $-6\sqrt{1-r^3}+C$

(24) $\frac{2}{3}(y^4+4y^2+1)^3+C$

(26) $\tan(x+2)+C$

(28) $\sec(\theta+\frac{\pi}{2})+C$

~~20~~, ~~22~~, ~~21~~

~~28~~, ~~18~~, ~~27~~

(54) $\frac{1}{3}$

(56) 0

(58) 0

20) $\int 28(7x-2)^3\,dx$ $u=7x-2$

$du=7dx$ $dx=\frac{du}{7}$

$28(1/7)(7x-2)^3du$

$\int 4u^3du$

$u^4=(7x-2)^4+C$

27. $u=\tan x$

$du=\sec^2 x\,dx$

$\int \sqrt{\tan x}\,\sec^2 dx$

$\int u^{1/2}du$

$2/3\,u^{3/2}+C \rightarrow \frac{2}{3}(\tan x)^{3/2}+C$

More 6.2 - Using Trig Substitution

① $\int \frac{dx}{\cos^2 2x} = \int \sec^2(2x)\,dx$

$u = 2x$
$du = 2\,dx$
$\frac{1}{2}du = dx$

$= \frac{1}{2}\int \sec^2 u\,du = \frac{1}{2}\tan u + C$
$= \frac{1}{2}\tan(2x) + C$

② $\int \cot^2(3x)\,dx$

$\sin^2 x + \cos^2 x = 1$
$1 + \cot^2 x = \csc^2 x$
$\tan^2 x + 1 = \sec^2 x$

$\int [\csc^2(3x) - 1]\,dx$

$u = 3x$
$du = 3\,dx$
$\frac{1}{3}du = dx$

$= \frac{1}{3}\int (\csc^2 u - 1)\,du$

$= \frac{1}{3}[-\cot u - u] + C = \frac{1}{3}[-\cot(3x) - (3x)] + C$
$= -\frac{1}{3}\cot(3x) - x + C$

③ $\int \cot 7x\,dx = \int \frac{\cos 7x}{\sin 7x}\,dx$

$u = \sin 7x$
$du = \cos 7x \cdot 7\,dx$
$\frac{1}{7}du = \cos 7x\,dx$

$= \frac{1}{7}\int \frac{du}{u} = \frac{1}{7}\ln|u| + C$
$= \frac{1}{7}\ln|\sin 7x| + C$

④ $\int_0^{\frac{\pi}{3}} \tan x \cdot \underline{\sec^2 x\,dx}$

$u = \tan x$
$du = \underline{\sec^2 x\,dx}$

$\int_{\tan 0}^{\tan\frac{\pi}{3}} u\,du = \int_0^{\sqrt{3}} u\,du = \frac{u^2}{2}\Big|_0^{\sqrt{3}} = \frac{(\sqrt{3})^2}{2} - \frac{0^2}{2} = \frac{3}{2}$

HW: p338 # 33-51 odds (#47 wrong in back)
53-56 all

U-Substitution with Definite Integrals

$$\int_0^{\pi/3} \tan x \sec^2 x \, dx \qquad u = \tan x \quad du = \sec^2 x \, dx$$

All in terms of u:

$$\int_{\tan 0}^{\tan \pi/3} u \, du = \int_0^{\sqrt{3}} u \, du = \frac{1}{2}u^2 \Big|_0^{\sqrt{3}} = \frac{1}{2}(\sqrt{3})^2 - \frac{1}{2}(0)^2$$

$$= \frac{3}{2}$$

or ... go back to x's

$$\int u \, du = \frac{1}{2}u^2 = \frac{1}{2}(\tan x)^2 \Big|_0^{\frac{\pi}{3}}$$

$$= \frac{1}{2}\left(\tan \frac{\pi}{3}\right)^2 - \frac{1}{2}(\tan 0)^2$$

$$= \frac{1}{2}(\sqrt{3})^2 - \frac{1}{2}(0)^2 = \frac{3}{2}$$

HW: p338 #33-51 odds, 54-56, 58, 71-76

#47 wrong in back