f'	f	$\int f$
0	1	$x + C$
1	x	$\frac{x^2}{2} + C$
$n x^{n-1}$	x^n	$\frac{x^{n+1}}{n+1} + C$
$\cos x$	$\sin x$	$-\cos x + C$
$-\sin x$	$\cos x$	$\sin x + C$
$\sec^2 x$	$\tan x$	
$\sec x \tan x$	$\sec x$	
$-\csc x \cot x$	$\csc x$	
$-\csc^2 x$	$\cot x$	
$-x^{-2}$	$\frac{1}{x}$	$\ln\lvert x \rvert + C$ Not yet Need it for the blanks, above
e^x	e^x	$e^x + C$

$(\ln 3)\, 3^x$ $\quad$ 3^x $\quad$ $\frac{1}{\ln 3} \cdot 3^x + C$

$\frac{d}{dx}\left[3^x\right] = K \cdot 3^x$

derivative is proportional to original function

$3^x = \left(e^{\ln 3}\right)^x = e^{(\ln 3)x}$

$(a^b)^c = a^{bc}$

$\frac{d}{dx}\left[3^x\right] = \frac{d}{dx}\left[e^{(\ln 3)x}\right] = e^{(\ln 3)x} \cdot \ln 3$

$= (\ln 3)(3^x)$

$\frac{d}{dx}\left[e^u\right] = e^u \frac{du}{dx} = \frac{d(e^u)}{du} \cdot \frac{du}{dx}$

$u = (\ln 3)x$

$\frac{du}{dx} = \ln 3$

4.5 TODAY / MONDAY

4.6 MONDAY

5.1-5.4 WS : Tuesday

#s 5, 6

5) Find average value of $f(x)=2x^2-5x+7$ on $[3, 11]$.

6) Find $c \ni f(c) = f_{ave}$ on $[3, 11]$

5) $$f_{ave} = \frac{1}{b-a}\int_a^b f(x)\,dx$$

$$= \frac{1}{8}\int_3^{11}(2x^2-5x+7)\,dx$$

$$= \frac{1}{8}\left[\frac{2}{3}x^3-\frac{5}{2}x^2+7x\right]_3^{11} \qquad \text{FTC II}$$

$$= \frac{1}{8}\left[\left(\frac{2}{3}(11)^3-\frac{5}{2}(11)^2+7(11)\right) - \left(\frac{2}{3}(3)^3-\frac{5}{2}(3)^2+7(3)\right)\right]$$

$$\begin{array}{r} 121 \\ \times\ 11 \\ \hline 121 \\ 121 \\ \hline 1331 \end{array}$$

$$= \frac{1}{8}\left[\left(\frac{2}{3}(1331)-\frac{5}{2}(121)+77\right) - \left(\frac{2}{3}(27)-\frac{5}{2}(9)+21\right)\right]$$

$$= \frac{242}{3}$$

⑥ Set $f(x) = f_{ave}$

$$2x^2 - 5x + 7 = \frac{242}{3}$$

$$\frac{242 - 21}{3} = \frac{221}{3}$$

$$2x^2 - 5x - \frac{221}{3} = 0$$

$$a = 2,\ b = -5,\ c = -\frac{221}{3}$$

$$b^2 - 4ac = (-5)^2 - 4(2)\left(-\frac{221}{3}\right)$$

$$= 25 + 8\left(\frac{221}{3}\right)$$

$$= \frac{75 + 1768}{3}$$

$$= \frac{1843}{3}$$

$$\begin{array}{r} 221 \\ \times\ 8 \\ \hline 1768 \\ +\ 75 \\ \hline 1843 \\ \times\ 3 \\ \hline 5529 \end{array}$$

$$x = \frac{5 \pm \sqrt{\frac{1843}{3}}}{2(2)} = \frac{\frac{15 \pm \sqrt{5529}}{3}}{4}$$

$$= \frac{15 \pm \sqrt{5529}}{12}$$

5.6

$$\frac{1}{3}\int \cos(3z+4)\,3\,dz$$

$u = 3z+4$

$du = 3\,dz$

$$= \frac{1}{3}\int \cos(u)\,du \qquad = \frac{1}{3}\sin u + C$$

is the goal

$$= \frac{1}{3}\sin(3z+4) + C$$

$$\int \cos(3z+4)\,dx$$

$$= \cos(3z+4)\cdot\int dx$$

$$= \cos(3z+4)\cdot(x+C)$$

$$\int \frac{\cos(37\pi x - 11)}{(x^{57}-13)^{27.3}}\,dz$$

$$\sum_{k=1}^{n} 3j = \underbrace{3j + 3j + 3j + \cdots + 3j}_{n \text{ of 'em}}$$

$$= 3nj$$

Oct 26-12:39 PM

5.5

$$\int \frac{\sec x \tan x}{\sqrt{\sec x}}\,dx$$

$u = \sec x$

$du = \sec x \tan x\,dx$

$$= \int \frac{1}{\sqrt{\sec x}} \cdot \sec x \tan x\,dx$$

$$= \int \frac{1}{\sqrt{u}} \cdot du = \int u^{-\frac{1}{2}}du = \frac{u^{\frac{1}{2}}}{\frac{1}{2}} + C$$

$$= 2u^{\frac{1}{2}} + C \quad = 2\sqrt{\sec x} + C$$

$$\frac{d}{dx}\left[2(\sec x)^{\frac{1}{2}}\right]$$

$$= \frac{1}{2} \cdot 2 \sec x^{-\frac{1}{2}} \cdot \sec x \tan x$$

$$= \frac{\sec x \tan x}{\sqrt{\sec x}}$$

5.6

$$\int_0^1 r\sqrt{1-r^2}\,dr$$

Scratch

$u = 1-r^2$

$du = -2r\,dr$

$$-\frac{1}{2}\int\sqrt{1-r^2}\,(-2r\,dr)$$

$$= -\frac{1}{2}\int u^{\frac{1}{2}}\,du$$

$$= -\frac{1}{2}\cdot\frac{2}{3}u^{\frac{3}{2}} + C$$

$$= -\frac{1}{3}(1-r^2)^{\frac{3}{2}} + C$$

$$= \left[-\frac{1}{3}(1-r^2)^{\frac{3}{2}}\right]_0^1 = -\frac{1}{3}\left[(1-1^2)^{3/2} - (1-0^2)^{\frac{3}{2}}\right]$$

$$= -\frac{1}{3}[-1] = \frac{1}{3}$$

$$\int_{0=r}^{1=r} r\sqrt{1-r^2}\,dr$$

$u = 1-r^2$

$du = -2r\,dr$

$r=0 \Longrightarrow$

$u = 1-r^2 = 1 = u$

$r=1 \Longrightarrow$

$u = 1-1^2 = 0 = u$

$$= -\frac{1}{2}\int_{0=r}^{1=r}\sqrt{1-r^2}\,(-2r\,dr)$$

$$= -\frac{1}{2}\int_{1=u}^{0=u} u^{\frac{1}{2}}\,du = -\frac{1}{2}\left[\frac{2}{3}u^{\frac{3}{2}}\right]_1^0$$

$$= \frac{1}{2}\cdot\frac{2}{3}\left[u^{\frac{3}{2}}\right]_0^1 = \frac{1}{3}\left[1^{\frac{3}{2}} - 0^{\frac{3}{2}}\right] = \frac{1}{3}$$