Today's Plan:

Learning Target (standard): I will integrate transcendental and non-transcendental functions.

Students will: Complete practice problems over previous concepts at the boards, put up homework problems on the board and make necessary corrections to their own work, take notes over new material and complete practice problems over new concepts.

Teacher will: Provide practice problems over previous concepts, check homework problems for accuracy and provide students feedback, describe and provide examples of new concepts and assign students assessment problems over new concepts.

Assessment: Board work, homework check and homework assignment

Differentiation: Students will work at the board, go over and correct homework at their seats, actively engage in lecture over new concepts, practice new concepts with the aid of other students and the teacher and complete homework assignment.

Inverse Trig Integrals:

1) $\frac{\sqrt{\pi}}{\pi}\sec^{-1}\left(\frac{\sqrt{\pi}}{\pi}x\right)+c$

2) $\frac{\sqrt{7}}{7}\tan^{-1}\left(\frac{\sqrt{7}}{7}x\right)+c$

3) $\tan^{-1}(\ln x)+c$

4) $\sin^{-1}(\tan x)+c$

5) $\frac{1}{2}\sin^{-1}\left(\frac{2}{3}x\right)+c$

6) $\frac{1}{3}\tan^{-1}\left(e^{3x}\right)+c$

13) $\frac{\pi}{2}$

21) $\frac{1}{4}\left(\sin^{-1}x\right)^4+c$

23a) $\frac{1}{2}\sin^{-1}x^2+c$

35) $\tan^{1}\left(e^{2}\right)-\frac{\pi}{4}$

Evaluate.

$$\int \frac{4}{\sqrt{1-x^2}}\,dx = 4\sin^{-1}x + C$$

Evaluate.

$$\int \frac{-2}{5x^2+5}\,dx = \int \frac{-2}{5(x^2+1)}\,dx$$

$$= -\frac{2}{5}\int \frac{1}{x^2+1}\,dx$$

$$= -\frac{2}{5}\tan^{-1}x + C$$

Evaluate.

$$\int \frac{dx}{\sqrt{4-x^2}} = \int \frac{1}{\sqrt{4\left(1-\frac{x^2}{4}\right)}}\,dx$$

$$= \frac{1}{2}\int \frac{1}{\sqrt{1-\left(\frac{x}{2}\right)^2}}\,dx$$

$u = \frac{x}{2}$

$du = \frac{1}{2}dx$

$2du = dx$

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

$$= \sin^{-1} u + C$$

$$\Rightarrow \sin^{-1}\left(\frac{1}{2}x\right) + C$$

Evaluate.

$$\int \frac{dx}{x^2+4x+5} = \int \frac{1}{\underline{x^2+4x+4}+1}\,dx$$

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

$u = x+2$

$du = 1\,dx$

$$\Rightarrow \int \frac{1}{u^2+1}\,du$$

$$= \tan^{-1} u + C$$

$$\Rightarrow \tan^{-1}(x+2) + C$$

Evaluate.

$$\int \frac{dx}{x^2+6x+10} = \int \frac{1}{x^2+6x+9+1}\,dx$$

$$= \int \frac{1}{(x+3)^2+1}\,dx$$

$u = x+3$

$du = dx$

$$\Rightarrow \int \frac{1}{u^2+1}\,du$$

$$= \tan^{-1} u + C$$

$$\Rightarrow \tan^{-1}(x+3) + C$$

Evaluate.

$$\int \frac{dx}{25+x^2} = \int \frac{1}{25\left(1+\frac{x^2}{25}\right)}\,dx$$

$$= \frac{1}{25} \int \frac{1}{1+\left(\frac{x}{5}\right)^2}\,dx$$

$u = \frac{x}{5}$

$du = \frac{1}{5}\,dx$

$5\,du = dx$

$$\Rightarrow \frac{1}{5} \int \frac{1}{1+u^2}\,du$$

$$= \frac{1}{5} \tan^{-1} u + C$$

$$\Rightarrow \frac{1}{5} \tan^{-1}\left(\frac{1}{5}x\right) + C$$

Evaluate.

$$\int (\cos x) e^{4+\sin x} dx$$

$u = 4 + \sin x$

$du = \cos x \, dx$

$\Rightarrow \int e^u \, du$

$= e^u + C$

$\Rightarrow e^{4+\sin x} + C$

Evaluate.

$$\int \sin 3x \sin(\cos 3x) dx$$

$u = \cos 3x$

$du = -3 \sin 3x \, dx$

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

$\Rightarrow -\frac{1}{3} \int \sin u \, du$

$= \frac{1}{3} \cos u + C$

$\Rightarrow \frac{1}{3} \cos(\cos 3x) + C$

Evaluate.

$$\int \frac{\cos x \ln(\sin x)}{\sin x} dx$$

$u = \ln(\sin x)$

$du = \frac{\cos x}{\sin x} dx$

$\Rightarrow \int u \, du$

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

$\Rightarrow \frac{1}{2} \ln^2(\sin x) + C$

Evaluate.

$$\int \frac{x + 2x^{\frac{3}{4}}}{x^{\frac{5}{4}}} dx = \int x^{-\frac{5}{4}}\left(x + 2x^{\frac{3}{4}}\right) dx$$

$$= \int \left(x^{-\frac{1}{4}} + 2x^{-\frac{1}{2}}\right) dx$$

$$= \frac{4}{3} x^{\frac{3}{4}} + 4x^{\frac{1}{2}} + C$$

Evaluate.

$$\int (3\cos x - \sin x)\,dx$$

$$= \int 3\cos dx - \int \sin x\,dx$$

$$= 3\sin x + \cos x + C$$

Evaluate.

$$\int \frac{4\cos x}{\sin^2 x}\,dx$$

$u = \sin x$

$du = \cos x\,dx$

$$\Rightarrow 4\int \frac{1}{u^2}\,du$$

$$= 4\int u^{-2}\,du$$

$$= -4u^{-1} + C$$

$$\Rightarrow \frac{-4}{\sin x} + C$$

or $-4\csc x + C$

Evaluate.

$$\int\left(4x-2e^{x}\right)dx = 2x^2-2e^x+C$$

Evaluate.

$$\int\left(2x^{-1}+\sin x\right)dx = 2\int\frac{1}{x}dx+\int\sin x\,dx$$

$$=2\ln|x|-\cos x+C$$

Evaluate.

$$\int\left(2\cos x-\sqrt{e^{2x}}\right)dx = 2\int \cos x\,dx - \int (e^{2x})^{\frac{1}{2}}dx$$

$$= 2\int \cos x\,dx - \int e^{x}dx$$

$$= 2\sin x - e^{x} + C$$

Evaluate.

$$\int_0^2\left(\frac{e^{2x}-2e^{3x}}{e^{3x}}\right)dx = \int_0^2 e^{-3x}\left(e^{2x}-2e^{3x}\right)dx$$

$$= \int_0^2 \left(e^{-x}-2\right)dx$$

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

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

$$= -\frac{1}{e^2}-4+1$$

$$= -\frac{1}{e^2}-3$$

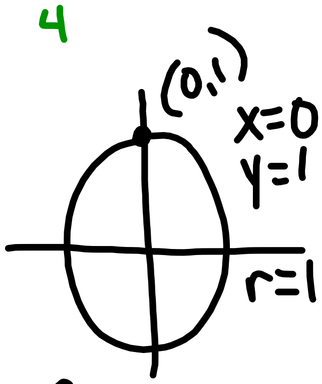
Evaluate.

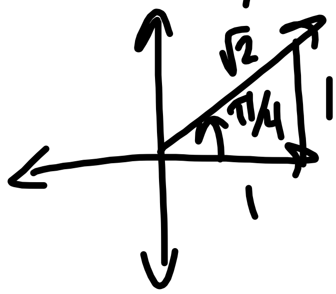
$$\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} 3\csc x \cot x\,dx = -3\csc x\Big|_{\frac{\pi}{4}}^{\frac{\pi}{2}}$$

$$= -3\left(\csc\frac{\pi}{2} - \csc\frac{\pi}{4}\right)$$

$$= -3\left(1 - \sqrt{2}\right)$$

$$= -3 + 3\sqrt{2}$$





Assignment:

Review of Logarithmic &
Trigonometric Integrals

#1-25

* 10 point assignment *

Review of Logarithmic & Trigonometric Integrals:

1) $3\tan\sqrt[3]{x}+c$

2) $-\frac{1}{15}\cos^5 3x+c$

3) $\sin^2 x+c$

$-\cos^2 x+c$

4) $-\cos x+\frac{2}{3}x^{\frac{3}{2}}+c$

5) $-\cos x-3\sin x+c$

6) $\frac{7}{2}x^{\frac{4}{7}}-5\cot x+c$

7) $-\frac{1}{\sin x}+c$

$-\csc x+c$

8) $-3x^{-1}-\ln|\cos x|-4x+c$

9) $\frac{1}{2}\tan^2 x+c$

10) $\frac{1}{3}\sqrt{\sin^3 2x}+c$

11) $\frac{1}{9(2-3\sin x)^3}+c$

12) $\frac{1}{6}\tan 3x^2+c$

13) $\frac{1}{20}\sec^5 4x+c$

14) $\frac{1}{4}\tan^2\left(3x^2\right)+c$

15) $-\frac{1}{3}\cos^3 x+\frac{1}{5}\cos^5 x+c$

16) $\sin^{-1}(x-2)+c$

17) $\ln\sqrt{17}$

18) $\frac{8\ln 2-3\ln 3}{\ln 3\ln 2}$

19) $\frac{-5^{-2x}}{2\ln 5}+c$

20) $\frac{1}{9}e^{3x^3}+c$

21) $-\frac{23^{-x^2}}{2\ln 23}+c$

22) $\frac{2\sqrt{2^x+1}}{\ln 2}+c$

23) $\frac{1}{4}\left(e^8-e^2\right)$

24) $\ln\left(\frac{4}{9}\right)$

25) $\frac{87381}{1024\ln 4}$