#7) $\int \frac{2x}{x+1}\,dx$

$$x+1 \overline{)\,2x} \quad 2$$
$$2x+2$$
$$-2$$

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

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

$$= 2x - 2\ln|x+1| + C$$

Set B

(f) $\int \frac{e^x}{\sqrt{3-2e^x-e^{2x}}}\,dx$

$e^x = m$

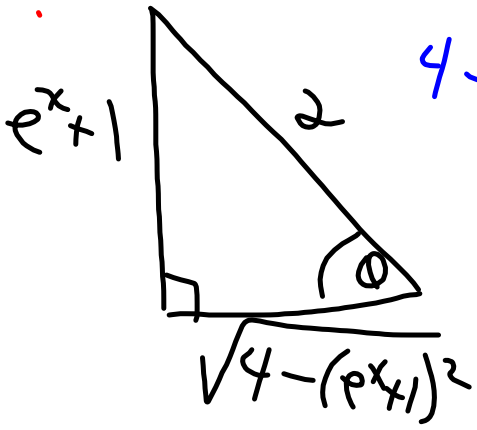
$3-((e^x)^2+2e^x)$

$3-(m^2+2m+1)+1$

$4-(m+1)^2$

$4-(e^x+1)^2$

$\int \frac{e^x\,dx}{\sqrt{4-(e^x+1)^2}}$



$2\cos\theta = \sqrt{4-(e^x+1)^2}$

$2\sin\theta = e^x+1$

$2\sin\theta - 1 = e^x$

$2\cos\theta\,d\theta = e^x\,dx$

$\int \frac{2\cos\theta\,d\theta}{2\cos\theta}$

$\int d\theta$

$= \theta + C$

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

(g) $\int \underbrace{16x}\ \underbrace{\tan^{-1}4x\,dx}$ Set A

$u = \tan^{-1}4x \qquad dv = 16x\,dx$

$du = \frac{4}{16x^2+1}dx \qquad v = 8x^2$

$= 8x^2\tan^{-1}4x - \int \frac{32x^2}{16x^2+1}dx$

$-32\int \frac{x^2}{16x^2+1}dx$

$16x^2+1 \overline{)\,x^2+0}$; $\frac{1}{16}$; $x^2 + \frac{1}{16}$; $-\frac{1}{16}$

$-32\left[\int \frac{1}{16}dx + \int \frac{-\frac{1}{16}}{16x^2+1}dx\right]$

$-2\int dx - \frac{1}{16}\int \frac{dx}{16x^2+1}$ (-32) $\left(\frac{1}{4}\right)$ (4) $(4x)^2$ $\frac{du}{u^2+1}$

$= 8x^2\tan^{-1}4x - 2x + \frac{1}{2}\tan^{-1}(4x) + C$

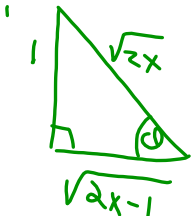
Set 13

a) $\int_1^5 \frac{x+2}{\sqrt{2x-1}}\,dx$

$\int_1^5 \frac{x\,dx}{\sqrt{2x-1}} + \int_1^5 \frac{2}{\sqrt{2x-1}}\,dx$

$\int (2x-1)^{-1/2}(2)\,dx$ $\quad u^n\ du$

$= 2(2x-1)^{1/2}$



$\csc\theta = \sqrt{2x}$ $\quad \cot\theta = \sqrt{2x-1}$

$\csc^2\theta = 2x$

$\frac{1}{2}\csc^2\theta = x$

$\frac{1}{2}(\csc\theta)^2 = x$

$(\csc\theta)^2$

$1\left((\csc\theta)^1(-\csc\theta\cot\theta\,d\theta)\right) = dx$

$\int \frac{\left(\frac{1}{2}\csc^2\theta\right)\left(-\csc^2\theta\cot\theta\,d\theta\right)}{\cot\theta}$

$-\frac{1}{2}\int \csc^4\theta\,d\theta$

$-\frac{1}{2}\int \csc^2\theta\csc^2\theta\,d\theta$

$-\frac{1}{2}\int (1+\cot^2\theta)\csc^2\theta\,d\theta$

$-\frac{1}{2}\int \csc^2\theta\,d\theta + \frac{1}{2}\int (\cot\theta)^2\csc^2\theta\,d\theta$

$+\frac{1}{2}\cot\theta + \frac{1}{6}\cot^3\theta$ $\quad 2\sqrt{2x-1}$

$+\frac{1}{2}\sqrt{2x-1} + \frac{1}{6}\left(\sqrt{2x-1}\right)^3 + 2\sqrt{2x-1}\ \Big|_1^5$

$= \left[\left(+\frac{3}{2} + \frac{9}{2} + 6\right) - \left(\frac{1}{2} + \frac{1}{6} + 2\right)\right]$ $\quad \frac{3+1+12}{6}$

$\frac{12}{1} - \frac{8}{3}$ $\quad \frac{16}{6} = \frac{8}{3}$

$= \frac{28}{3}$

Warm Up

Simon Fraser University: Final Exam 2006

1. Evaluate the following, if it is possible: **[4 marks each = 24 marks]**

a) $\int x^2 (\ln x)^2 \, dx$

b) $\int_0^{\frac{\pi}{2}} \cos^3 x \sin 2x \, dx$

c) $\int \frac{3}{x^{-\frac{1}{2}}\left(x^{\frac{3}{2}} - x^{\frac{1}{2}}\right)} dx$

d) $\int \frac{\sqrt{x^2 - 1}}{x} dx$

e) $\int_0^3 \frac{dx}{x^2 - x - 2}$

f) $\frac{d}{dx}\int_e^{\ln x} \sin(t^2 + 1)\, dt$

Attachments

Review - Practice Test for Sinusoidal Functions.doc

Review - Trigonometric Functions(3)(4).doc