Test 3 A

1. $\int_0^4 (5x - x^2 - x)\,dx$

2. $\int_0^{\pi/4} (\cos x - \sin x)\,dx$

3. $\int_0^1 e^x\,dx = \boxed{e-1}$

4. $\int_{\pi/4}^{3\pi/4} \sqrt{1+\left(\frac{\cos x}{\sin x}\right)^2} = \int_{\pi/4}^{3\pi/4} \csc x\,dx$

3B:

1. $\int_0^8 \pi\left(\sqrt[3]{x}\right)^2 dx$

2. $\pi(8)^2(2) - \int_0^2 \pi(y^3)^2\,dy$

3. $\int_0^2 \pi(8-y^3)^2\,dy$

4. $\pi(9)^2(2) - \int_0^2 \pi\left(y^3-(-1)\right)^2 dy$

5. $\pi(5)^2(8) - \int_0^8 \pi\left(5-\sqrt[3]{x}\right)^2 dx$

Test # 4

1. b
2. e
3. c
4. c
5. e
6. a

2. $\frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+3}$

$= \frac{(A+C)x^2 + (3A+B)x + 3B}{x^2(x+3)}$

$A + C = 6 \qquad A = 5$

$3A + B = 14 \qquad B = -1$

$3B = -3 \qquad C = 1$

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

$= 5\ln|x| + \frac{1}{x} + \ln|x+3| + C$

$= \ln|x^5| + \ln|x+3| + \frac{1}{x} + C$

$= \ln|x^5(x+3)| + \frac{1}{x} + C$

$= \ln|x^6 + 3x^5| + \frac{1}{x} + C$

5. $\int e^t \sin 6t \, dt$ $\quad u = e^t \quad du = e^t dt \quad dv = \sin 6t \, dt \quad v = -\frac{1}{6}\cos 6t$

$= -\frac{1}{6}e^t \cos 6t + \int + \frac{1}{6} e^t \cos 6t \, dt$

$u = e^t \quad du = e^t dt \quad dv = \frac{1}{6}\cos 6t \, dt \quad v = \frac{1}{36}\sin 6t$

$$\int e^t \sin 6t \, dt = \underbrace{-\frac{1}{6}e^t \cos 6t + \frac{e^t}{36}\sin 6t}_{\downarrow} - \int \frac{1}{36} e^t \sin 6t \, dt$$

$$\frac{37}{36}\int e^t \sin 6t \, dt = \downarrow$$

$$\int e^t \sin 6t \, dt = \frac{36}{37}\left(-\frac{1}{6}e^t \cos 6t + \frac{e^t}{36}\sin 6t\right)$$

$u = \sin 6t \qquad dv = e^t dt$

$du = 6\cos 6t \qquad v = e^t$

5. $\int \sin^2 3x\,dx$ $\qquad \sin^2\theta = \dfrac{1-\cos 2\theta}{2}$

$$= \int \frac{1-\cos 6x}{2}\,dx = \int \left(\tfrac{1}{2} - \tfrac{1}{2}\cos 6x\right)dx$$

$$= \frac{1}{2}x - \frac{1}{12}\sin 6x + C$$

$\sin 2\theta = 2\sin\theta\cos\theta$

$$= \frac{\cancel{1}^{3/6}}{\cancel{2}}x - \frac{1}{\cancel{12}_{6}}\left(\cancel{2}\sin 3x\cos 3x\right)$$

$$= \frac{3x - \sin 3x\cos 3x}{6} + C$$

6. $\int \dfrac{x\,dx}{(49-x^2)^{3/2}}$, $\quad x = 7\sin\theta$, $\quad dx = 7\cos d\theta$

$$= \int \frac{(7\sin\theta)\,7\cos\theta\,d\theta}{\left(\sqrt{49-(7\sin\theta)^2}\right)^3} = \int \frac{\cancel{7}\cdot\cancel{7}\cdot\sin\theta\cancel{\cos\theta}\,d\theta}{(7\cos\theta)^3}$$

$\cancel{7}\cdot\cancel{7}\cdot 7\cdot \cancel{\cos x}\cos^2 x$

$49\sin^2\theta$

$49(1-\sin^2\theta)$

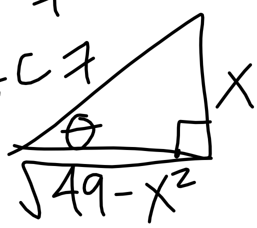
$\sqrt{49\cos^2\theta}$

$$= \int \frac{1}{7}\sec\theta\tan\theta\,d\theta = \frac{1}{7}\sec\theta$$

$x = 7\sin\theta$

$\dfrac{x}{7} = \sin\theta$

$$= \frac{1}{\cancel{7}}\cdot\frac{\cancel{7}}{\sqrt{49-x^2}} = \frac{1}{\sqrt{49-x^2}} + C$$



Symoon
Peoplez

$\int x^2 e^{x^3} dx$

$u = x^3$

$du = 3x^2$

$\frac{1}{3} du = x^2 dx$

$\frac{1}{3}\int e^u du$

$e^{x^3} / 3x^2$

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

$\cancel{3x^2}$

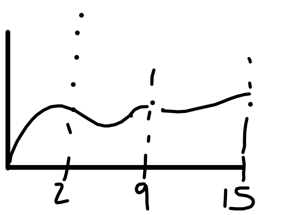
$\left(e^{x^3}\right)' = e^{x^3} 3x^2$

$\int_2^9 f(x) = ?$

if

$\int_2^{15} f(x)\,dx = 5$

$\int_{15}^{9} f(x)\,dx = 1$



=6

=1

=5

$f(x) = \underline{\cos 6x}$

$-\frac{\pi}{2} \le x \le \pi$

$\left(\frac{1}{b-a}\right)\int_a^b f(x)$

$\left(\frac{1}{\pi + \frac{\pi}{2}}\right)\int_{-\frac{\pi}{2}}^{\pi} \cos 6x\,dx$

$= \left(\frac{1}{6}\sin 6(\pi) - \frac{1}{6}\sin 6(-\pi/2)\right)\left(\frac{1}{\pi + \pi/2}\right)$

$= \frac{2}{9\pi}$:)