Quiz 14
Q 1.

$$\text{Trap} = \frac{b-a}{2n}\left[f(x_0) + 2f(x_1) + 2f(x_2) + \dots + 2f(x_{n-1}) + f(x_n)\right]$$

$[0, 2]$ $n = 5$

$x_0 =$ $x_1 =$ $x_2 =$ $x_3 =$

$x_4 =$ x_5

Quiz 14
Q 2

$$\int_0^1 \sin^2\left(\frac{\pi x}{6}\right) \quad n = 4$$

$x_0 = 0$ $x_1 = \frac{1}{2}$ $x_2 = 1$ $x_3 = \frac{3}{2}$ $x_4 = 4$

$$T = \frac{1-0}{2\cdot 4}\left[f(0) + 2f\left(\tfrac{1}{2}\right) + 2f(1) + 2f\left(\tfrac{3}{2}\right) + f(4)\right]$$

$$= \frac{1}{8}\left[\sin^2\frac{\pi 0}{6} + 2\sin^2\frac{\pi}{6\cdot 2} + 2\sin^2\left(\frac{\pi}{6}\right) + 2\sin^2\left(\frac{\pi \cancel{3}}{\cancel{6}\cdot 2}\right) + \sin^2\left(\frac{4\pi}{6}\right)\right]$$

$$= \frac{1}{8}\left[(\sin(0))^2 + 2\left(\sin\left(\frac{\pi}{12}\right)\right)^2 + 2\left(\sin\frac{\pi}{6}\right)^2 + 2\left(\sin\left(\frac{\pi}{4}\right)\right)^2 + \left(\sin\left(\frac{2\pi}{3}\right)\right)^2\right]$$

ques 5

$$S = \frac{1-0}{3\cdot 4}\left[f(0) + 4f\left(\tfrac{1}{2}\right) + 2f(1) + 4f\left(\tfrac{3}{2}\right) + f(2)\right]$$

quest

$$\int_0^2 \frac{1}{\sqrt{x^3+1}}\,dx \qquad n=8 \qquad 1+\frac{1}{4} \quad \frac{3}{2}+\frac{1}{4}=\frac{6+1}{8}$$

$$\underset{x_0}{0},\ \underset{x_1}{\frac{1}{4}},\ \underset{x_2}{\frac{1}{2}},\ \underset{x_3}{\frac{3}{4}},\ \underset{x_4}{1},\ \underset{x_5}{\frac{5}{4}},\ \underset{x_6}{\frac{3}{2}},\ \underset{x_7}{\frac{7}{8}},\ \underset{x_8}{2}$$

ques

$$\int_0^5 \sin 2x\,dx \qquad n=8$$

$$|E_n^S| = \frac{(b-a)^5}{180n^4}M$$

$$= \frac{(5-0)^5}{180\cdot 8^4}\cdot 16$$

$$= \frac{5^2\cdot 16}{180\cdot 8^4}$$

$$|f^4(x)| \le M$$

$$|2^4 \cos 2x|$$

$$M = 2^4 = 16$$

$$f(x) = \sin 2x$$

$$f'(x) = 2\cos 2x$$

$$f''(x) = -4\sin 2x$$

$$f'''(x) = -8\cos 2x$$

$$f^4(x) = 16\cos 2x$$

(*) Quiz 112

q-2

$$\int \frac{4x^2\,dx}{\sqrt{36-x^2}}$$

$x = 6\sin\theta$

$dx = 6\cos\theta\,d\theta$

$$= \int \frac{4\cdot 36\sin^2\theta\cdot 6\cos\theta\,d\theta}{\sqrt{36-36\sin^2\theta}}$$

$$= \int \frac{4\cdot 36\sin^2\theta\cdot \cancel{6}\,\cancel{\cos\theta}\,d\theta}{\cancel{6}\,\cancel{\cos\theta}}$$

$\cos 2\theta = \cos^2\theta - \sin^2\theta$

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

$\cos 2\theta = 1 - 2\sin^2\theta$

$2\sin^2\theta = 1 - \cos 2\theta$

$\sin^2\theta = \frac{1}{2}(1-\cos 2\theta)$

$$= 144\int \sin^2\theta\,d\theta$$

$$= 144\int \frac{1}{2}(1-\cos 2\theta)\,d\theta$$

$$= 72\int (1-\cos 2\theta)\,d\theta$$

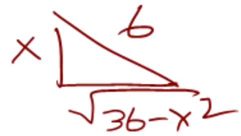
$$= 72\left[\theta - \frac{\sin 2\theta}{2}\right] + C$$

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

$$= 72\left[\theta - \frac{\cancel{2}\sin\theta\cos\theta}{\cancel{2}}\right] + C$$

$x = 6\sin\theta$

$\frac{x}{6} = \sin\theta$



$$= 72\theta - 72\sin\theta\cos\theta + C$$

$$= 72\sin^{-1}\frac{x}{6} - \cancel{72}^{\,2}\,\frac{x}{\cancel{6}}\,\frac{\sqrt{36-x^2}}{\cancel{6}} + C$$

$$= 72\sin^{-1}\frac{x}{6} - 2x\sqrt{36-x^2} + C$$

Quiz 13

9-7

$$\int \frac{5}{x^4-1}\,dx$$

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

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

$$\frac{5}{(x-1)(x+1)(x^2+1)} = \frac{A}{x-1} + \frac{B}{x+1} + \frac{Cx+D}{x^2+1}$$

$$5 = A(x+1)(x^2+1) + B(x-1)(x^2+1) + (Cx+D)(x-1)(x+1)$$

$x=1$ $\quad 5 = A(2)(2) \Rightarrow 5 = 4A \Rightarrow 5/4 = A$

$x=-1$ $\quad 5 = B(-2)(2) \Rightarrow 5 = -4B \Rightarrow -5/4 = B$

$x=0$ $\quad 5 = A - B + D(-1)(1)$

$$5 = \frac{5}{4} + \frac{5}{4} - D \Rightarrow 5 = \frac{5}{2} - D$$

$$\Rightarrow \frac{5}{2} = -D \Rightarrow D = -5/2$$

$x=2$ $\quad 5 = A(3)(5) + B(1)(5) + (2C+D)(1)(3)$

$$5 = \frac{5}{4}\cdot 15 - \frac{5}{4}\cdot 5 + \left(2C - \frac{5}{2}\right)(3)$$

$$5 = \frac{75}{4} - \frac{25}{4} + 6C - \frac{15}{2}$$

$$5 = \frac{50}{4} - \frac{15}{2} + 6C \Rightarrow 5 = \frac{25}{2} - \frac{15}{2} + 6C$$

$$\Rightarrow 5 = \frac{10}{2} + 6C \Rightarrow C = 0$$

$$\int \frac{5}{4(x-1)}\,dx - \int \frac{5}{4(x+1)}\,dx + \int \frac{-5}{2(x^2+1)}\,dx$$

$$= \frac{5}{4}\ln|x-1| - \frac{5}{4}\ln|x+1| - \frac{5}{2}\tan^{-1}x + C$$

Quiz 11
Q-7

$$\int_0^{\pi/6} 5\cos^2 3x\, dx$$

$$= \frac{5}{2}\int_0^{\pi/6} (1+\cos 6x)\, dx$$

$$= \frac{5}{2}\left[x + \frac{\sin 6x}{6}\right]_0^{\pi/6}$$

$$= \frac{5}{2}\left[\left(\frac{\pi}{6} + \frac{\sin 6\pi/6}{6}\right) - \left(0 - \frac{\sin 0}{6}\right)\right]$$

$$= \frac{5\pi}{12}$$

$\cos 2\theta = \cos^2\theta - \sin^2\theta$
$= \cos^2\theta - (1-\cos^2\theta)$

$\cos 2\theta = 2\cos^2\theta - 1$

$2\cos^2\theta = \cos 2\theta + 1$

$\cos^2\theta = \dfrac{1+\cos 2\theta}{2}$

$\cos^2 3x = \dfrac{1+\cos 6x}{2}$

* Quiz 10
Q-9

$$\int_0^5 3x^2 e^{-x}\, dx = 3\int_0^5 x^2 e^{-x}\, dx$$

$\int x^2 e^{-x}\, dx$ $\qquad u = x^2 \quad dv = e^{-x}dx$

$\qquad du = 2x\,dx \quad v = -e^{-x}$

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

$= -x^2e^{-x} + 2\int x e^{-x}\, dx$ $\qquad u = x \quad dv = e^{-x}$

$= -x^2e^{-x} + 2\left[-xe^{-x} - \int -e^{-x}\, dx\right]$ $\qquad du = dx \quad v = -e^{-x}$

$= -x^2e^{-x} + 2\left[-xe^{-x} + \int e^{-x}\, dx\right]$

$= -x^2e^{-x} + 2\left[-xe^{-x} - e^{-x}\right] + C$

$= -x^2e^{-x} - 2xe^{-x} - 2e^{-x} + C$

$$\int_0^5 3x^2 e^{-x}\, dx = -3x^2e^{-x} - 6xe^{-x} - 6e^{-x}\Big|_0^5$$

$$= (-75e^{-5} - 30e^{-5} - 6e^{-5}) - (-6e^{-0})$$

$$= -111e^{-5} + 6$$