HADHRAMOUT UNIVERSITY

COLLEGE OF COMPUTERS & INFORMATION TECHNOLOGY

MONTHLY TEST

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34/34

Question (1)C:

Choose the correct answer:

1) $\sum_{i=1}^{6} 10\, i^2 =$

(a) 550 (b) 910 (c) 1400 (d) 300

2) $\int \sin\frac{\left(\frac{7}{x}\right)}{x^2}\, dx =$ $\frac{\sin\left(\frac{7}{x}\right)}{x^2}$

(a) $\frac{1}{3}\cos\left(\frac{3}{x}\right) + c$ (b) $\cos\left(\frac{3}{x}\right) + c$ (c) $\frac{1}{7}\cos\left(\frac{7}{x}\right) + c$ (d) $\cos\left(\frac{7}{x}\right) + c$

3) $\int_{-2}^{2}(4x^3 - 2x + 5)dx =$

(a) 10 (b) 0 (c) 30 (d) 20

4) If $F(x) = x^3$, then $f(x) =$

(a) $2x$ (b) $3x^2$ (c) $4x^3$ (d) $5x^4$

12/12

Question (2):

State true or false and justify your answer:

1) $\int_{-1}^{7} \sqrt[3]{x+1}\, dx = 12$ (✓) put $u = x+1$ ∴ $du = 1dx \Rightarrow \int_{-1}^{7} \sqrt[3]{u}\, du$ $= \frac{3}{4} u^{\frac{4}{3}} \Big|_{-1}^{7} = \frac{3}{4}(x+1)^{\frac{4}{3}} \Big|_{-1}^{7} = \frac{3}{4}(7+1)^{\frac{4}{3}} - \left(\frac{3}{4}(-1+1)^{\frac{4}{3}}\right)$ $= \boxed{12} = 12$ 2

2) $\int_{0}^{4}|2x - 4|\, dx = 5$ (✗)

3) $\int_{x_0}^{x_n} f(x)dx = \frac{h}{3}(y_0 + y_n + 4(y_1 + y_3 + \cdots + y_{n-1}) + 2(y_2 + y_4 + \cdots + y_{n-2}))$ Is a simpson s rule (✓) 2

4) $\int_{1}^{2}(3x^2 + 4)dx \le 0$ (✗)

8/8

Question (3):

Find the lower bound and upper bound of the integral $\int_{-2}^{-1} \frac{dx}{2x^2-1}$ ~~dx~~

$-2 \le x \le -1 \Rightarrow 1 \le x^2 \le 4 \Rightarrow 2 \le 2x^2 \le 8$

$1 \le 2x^2 - 1 \le 7 \Rightarrow \frac{1}{7} \le \frac{1}{2x^2-1} \le 1$

$\Rightarrow \frac{1}{7}(-1+2) \le \int_{-2}^{-1} \frac{dx}{2x^2-1} \le 1(-1+2)$

$\frac{1}{7} \le \int_{-2}^{-1} \frac{dx}{2x^2-1} \le 1$

6/6

The lower bound is $\boxed{\frac{1}{7}}$ and the upper bound is $\boxed{1}$

Q2) 2) $|2x-4| = \begin{cases} 2x-4 & , \boxed{x \geq 2} \\ -(2x-4) & , \boxed{x \leq 2} \end{cases}$

$\therefore \int_0^4 |2x-4|\,dx = \int_0^2 (2x-4)\,dx + \int_2^4 (-2x+4)\,dx$

$= x^2 - 4x \Big|_0^2 + \left(-x^2 + 4x \Big|_2^4\right)$

$= (2^2 - 4.2) - (0) + (-4^2 + 4.4) - (-2^2 + 4.2)$

$= -4 + (-16+16) - (-4+8) = -4 - 4 = \boxed{-8} \neq 5$

2

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4) $1 \leq x \leq 2 \Rightarrow 1 \leq x^2 \leq 4 \Rightarrow 3 \leq 3x^2 \leq 12$

$7 \leq 3x^2 + 4 \leq 16$

$3x^2 + 4 > 0$

$\therefore \int_1^2 (3x^2+4)\,dx > 0$

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34/34

Question (1)D:

Choose the correct answer:

1) $\sum_{i=1}^{5} 10\, i^2 =$

(a) 550 (b) 910 (c) 1400 (d) 300

2) $\int 7 \frac{\sin\left(\frac{7}{x}\right)}{x^2} dx =$

(a) $\frac{1}{3}\cos\left(\frac{3}{x}\right) + c$ (b) $\cos\left(\frac{3}{x}\right) + c$ (c) $\frac{1}{7}\cos\left(\frac{7}{x}\right) + c$ (d) $\cos\left(\frac{7}{x}\right) + c$

3) $\int_{-3}^{3}(4x^3 - 2x + 5)dx =$

(a) 10 (b) 0 (c) 30 (d) 20

4) If $F(x) = x^2$, then $f(x) =$

(a) $2x$ (b) $3x^2$ (c) $4x^3$ (d) $5x^4$

12/12

$u = \frac{7}{x}$. $du = \frac{-7}{x^2} dx$

$dx = \frac{x^2 du}{-7}$

$\frac{7 \sin u}{x^2} \cdot \frac{x^2 du}{-7}$

$-\int \sin u \, du$

$-(-\cos u \, du) \Rightarrow \boxed{+\cos\left(\frac{7}{x}\right) + C}$

Question (2):

State true or false and justify your answer:

8/8

1) $\int_{-1}^{7} \sqrt[3]{x+1}\, dx = 46$ (×)

2) $\int_{0}^{4}|2x - 4|\, dx = 8$ (✓)

3) $\int_{x_0}^{x_n} f(x)dx = \frac{h}{3}(y_0 + y_n + 2(y_1 + y_3 + \cdots + y_{n-1}) + 4(y_2 + y_4 + \cdots + y_{n-2}))$

Is a simpson s rule (×)

4) $\int_{1}^{2}(3x^2 + 4)dx \geq 0$ (✓)

Question (3):

Find the lower bound and upper bound of the integral $\int_{-2}^{-1} \frac{dx}{2x^2-1}$.

(3) $\int_{-2}^{-1} \frac{dx}{2x^2-1}$

Sol: $-2 \leq x \leq -1$

$4 \geq x^2 \geq 1$

$8 \geq 2x^2 \geq 2$

$7 \geq 2x^2 - 1 \geq 1$

$\frac{1}{7} \leq \frac{1}{2x^2-1} \leq 1$

$\frac{1}{7}(-1+2) \leq \int \frac{dx}{2x^2-1} \leq 1\,(-1+2)$

$\frac{1}{7} \leq \int \frac{dx}{2x^2-1} \leq 1$

∴ the lower bound is $\boxed{\frac{1}{7}}$

and the upper bound is $\boxed{1}$

6/6

② $\boxed{1=}$ $\int_{-1}^{7} \sqrt[3]{x+1} \Rightarrow \int_{-1}^{7} (x+1)^{\frac{1}{3}} \Rightarrow \frac{3(x+1)^{\frac{4}{3}}}{4}\Big|_{-1}^{7}$ $\quad \frac{1}{3}+1 = \frac{1+3}{3} = \boxed{\frac{4}{3}}$

$$\Rightarrow \left[\frac{3(7+1)^{\frac{4}{3}}}{4}\right] - \left[\frac{3(-1+1)^{\frac{4}{3}}}{4}\right] \Rightarrow \frac{3(8)^{\frac{4}{3}}}{4} - 0 = \boxed{12}$$

$12 \neq 46$ (X)

2

$\boxed{2=}$ $\int_0^4 |2x-4|\,dx \Rightarrow |2x-4| \begin{cases} 2x-4 & , x \geq 2 \\ -(2x-4) & , x < 2 \end{cases}$

$$\Rightarrow \int_0^4 |2x-4|dx = \int_0^2 (-2x+4)dx + \int_2^4 (2x-4)\,dx$$

$$-x^2+4x\Big|_0^2 + x^2-4x\Big|_2^4$$

$$\left[\left[-2^2+4(2)\right]-0\right] + \left[\left[4^2-4(4)\right]-\left[2^2-4(2)\right]\right]$$

$$\left[(-4+8)\right] + \left[(16-16)-(4-8)\right]$$

$-(-4)$

التعديل

$$4 + 4 = \boxed{8.} = 8 \quad (\checkmark)$$

2

$\boxed{3=}$ $\int_{x_0}^{x_n} f(x)dx = \frac{h}{3}\left(y_0 + y_n + 4(y_1+y_3+y_5 \cdots y_{n-1}) + 2(y_2+y_4 \cdots y_{n-2})\right)$

2

is simpson rule

$\boxed{4=}$ $\int_1^2 (3x^2+4)\,dx \geq 0$

$\Rightarrow 1 \leq x \leq 2$

$1 \leq x^2 \leq 4$

$3 \leq 3x^2 \leq 12$

$7 \leq 3x^2+4 \leq 16$

2

$3x^2+4 \geq 7$

$\therefore 3x^2+4 \geq 0 \rightarrow \therefore \int_1^2 (3x^2+4)dx \geq 0$ $(\checkmark)$