Typed

Test

Class Test 2

Q1. $y = \frac{1}{3}x^3 + 2x^2 - 5x$

$y' = x^2 + 4x - 5$

Critical points $\Rightarrow$ $x^2 + 4x - 5 = 0$

$x^2 + 5x - x - 5 = 0$

$x(x+5) - 1(x+5) = 0$

$(x+5)(x-1) = 0$

$\therefore x = -5$ or 1

$y'' = 2x + 4$

$y''(-5) < 0$ so $a = -5$ is a rel. maximum.

$y''(1) > 0$, so $b = 1$ is a rel. minimum

$a + 5b = -5 + 5(1) = 0$

Q1. Answer is 0 (A)

Q2 $$\int \frac{8x^{9/5} - 4x^3 + x^2 e^x}{x^2}\,dx = 8\int x^{\frac{9}{5}-2}\,dx - 4\int x\,dx + \int e^x\,dx$$

$\frac{-1+5}{5} = \frac{4}{5}$

$$= 8\int x^{-\frac{1}{5}}\,dx - 4\int x\,dx + \int e^x\,dx$$

$$= 8\,\frac{x^{-\frac{1}{5}+1}}{-\frac{1}{5}+1} - 4\frac{x^2}{2} + e^x + c$$

$$= 8\,\frac{x^{4/5}}{4/5} - 2x^2 + e^x + c$$

$$= 10x^{4/5} - 2x^2 + e^x + c$$

Answer B

Q3.

$$5x+2 \overline{)\,10x^2+14x+5\;\;\Big|\;\;2x+2}$$

$10x^2+4x$

$10x+5$

$10x+4$

1

$$2x+2+\frac{1}{5x+2}$$

Answer E

c.f.T 2

Q4. $f(x)=x^3-6x^2+9x$

$f'(x)=3x^2-12x+9$

$f''(x)=6x-12$ $\quad x=2$

$(-\infty,2)\;\&\;(2,\infty)$ ✓

Answer $(2,\infty)$ i.e., C

Q5 $f(x)=3x^4-x^6$ over $[-1,1]$ is

$f(x)=3x^4-x^6=x^4(3-x^2)$

For $-1\le x\le 1$ we have $x^4\ge 0$ and $3-x^2\ge 2>0$. Thus, $f(x)\ge 0$. At $x=0$: $f(0)=0$

∴ Answer 0. E

Q6 $f(x)=e^{x^2}$ Let $u=x^2 \Rightarrow \frac{du}{dx}=2x$

$f'(x)=e^u\cdot\frac{du}{dx}=e^{x^2}\cdot 2x=2xe^{x^2}$

& Let $z=x^2 \Rightarrow \frac{dz}{dx}=2x$

$\Rightarrow f''(x)=2e^u+2x\cdot e^u\cdot\frac{dz}{dx}=2e^{x^2}+2xe^{x^2}\cdot 2x=2e^{x^2}+4x^2e^{x^2}$ Answer

$f''(1)=2e+4e=6e$ // C

CIT 2

Q7. $y = e^x$.

Near $x=0$, $dy = e^x dx$

Taking $dx = 0.001$ and $e^0 = 1$

$dy \approx 1(0.001) = 0.001$.

Therefore, $e^{0.001} = e^{0+0.001} \approx e^0 + dy = 1 + 0.001 = 1.001$

Answer D

Q8. $y' = -x^2 + 2x$ and $y(2) = 1$, then $y(1)$ is

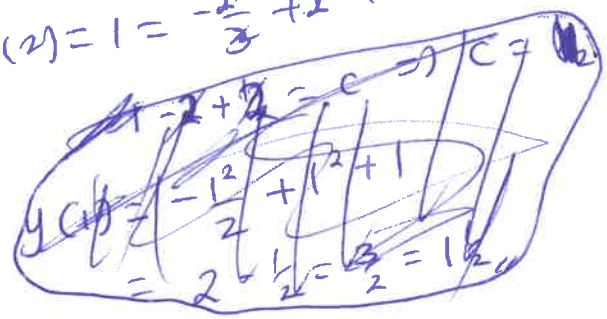
$\int dy = \int (-x^2 + 2x)\, dx$

$y = -\frac{x^3}{3} + x^2 + C$

$y(2) = 1 = -\frac{2^3}{3} + 2^2 + C \Rightarrow 1 = \frac{-8}{3} + \frac{24}{3} = \frac{-8+24}{3} = \frac{16}{3}$

$1 - \frac{16}{3} = C$

$\frac{3-16}{3} = -\frac{13}{3} = C$



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

$y(1) = -\frac{1^3}{3} + 1^2 - \frac{13}{3}$

$\frac{-1 + 3 - 13}{3} = \frac{3-16}{3} = -\frac{13}{3}$

Answer D

Q9 Given $\frac{dR}{dq} = 275 - 2 - 0.3q^2$

Integrate to find the revenue

$$R(q) = 275q - \frac{q^2}{2} - 0.1q^3 + C$$

assuming $R(0) = 0$. $C = 0$

The unit price is

$$p(q) = \frac{R(q)}{q} = 275 - \frac{q}{2} - 0.1q^2$$

At $q = 10$:

$$p(10) = 275 - 5 - 10 = 260$$

Answer 260 A

Q10 $y = x^{x^2+1}$

Take the log of both sides

$$\ln y = (x^2+1)\ln x$$

differentiate $\frac{y'}{y} = 2x\ln x + \frac{x^2+1}{x}$

$$y' = x^{x^2+1}\left(2x\ln x + \frac{x^2+1}{x}\right), \quad x > 0$$

$$= x^{x^2+1}\left(2x\ln x + x + \frac{1}{x}\right)$$

$$= x^{x^2}\cdot x\left(2x^2\ln x + x^2 + 1\right)$$

$$= x^{x^2}\left(x^2 + 1 + 2x^2\ln x\right)$$

Answer C