Question	I(1-4)	I(5)	II	III	IV	Total
Mark						

Question I: (1×5=5 points)

Question	1	2	3	4	5
Answer					

Choose the correct answer, then fill in the table above:

(1) If $e^{3\ln|x|-\ln 2} = 4$ then $x =$

(a) 2.

(b) 8.

(c) $\frac{8}{3}$.

(d) None of the previous.

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(2) If $f(x) = \log|\operatorname{csch} x|$ then $f'(x) =$

(a) $\frac{\coth x}{\ln 10}$.

(b) $\frac{-\coth x}{\ln 10}$.

(c) $\coth x\ (\ln 10\ )$.

(d) None of the previous.

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(3) $\cosh(\ln 4) =$

(a) $\frac{17}{8}$.

(b) $\frac{15}{8}$.

(c) $\frac{15}{2}$.

(d) None of the previous.

(4) If $f(x) = \sinh^{-1}(x^2)$ then $f'(x) =$

(a) $\frac{-2}{x\sqrt{1-x^4}}$.

(b) $\frac{2x}{1+x^4}$.

(c) $\frac{2x}{\sqrt{x^4+1}}$.

(d) None of the previous.

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(5) If the graph of $f(x) = x^3$ from $A(1,1)$ to $B(2,8)$ is revolved about the $x - axis$, then the area of the resulting surface (surface area) is given by:

(a) $\int_1^2 x^3\sqrt{1+9x^4}\ dx$.

(b) $\int_1^2 2\pi x^3\sqrt{1+9x^4}\ dx$.

(c) $\int_1^2 2\pi\sqrt{1+9x^4}\ dx$.

(d) None of the previous.

Question II: (2.5 points)

Use logarithmic differentiation to find y' [2.5 points]

$$y = \left(\frac{\tan x}{e^{2x}}\right)^x .$$

Question III: (4+3= 7 points)

A. Let R be the region bounded by the graphs of

$$y = 5 - x^2 \; and \; y = 1, \qquad and \; x = 0.$$

Then answer the following: [4 points]

(i) **Sketch** the region R.

(ii) **Set up an integral** to find the volume of the solid generated by revolving R about the $x - axis$.

(iii) **Set up an integral** to find the volume of the solid generated by revolving R about the $y - axis$.

B. Find the arc length of the graph of

$$y = \sqrt{4 - x^2}$$

from $x = 0$ to $x = 1$. [3 points]

Question IV: (2+2+2+2.5+2= 10.5 points)

Evaluate the following integrals:

(i) $\int \frac{\sinh(4x)}{1+\cosh^2(4x)}\, dx$ [2 points]

(ii) $\int \frac{(x)\, 7^{x^2}}{3+\, 7^{x^2}}\, dx$ [2 points]

(iii) $\int x(\tanh(x^2) + \sec(x^2))\, dx$ [2 points]

(iv) $\int_0^1 (5x+3)e^{-x}dx$ [2.5 points]

(v) $\int_e^2 \frac{1}{x\ \ln|x|}\,dx$ [2 points]

Good Luck 😊