1.   Find $\int \dfrac{1}{1+e^{-2x}} \, dx$.

                                                                                                  [6 marks]

2.   Use the Trapezoidal Rule with $n = 4$ to approximate $\int_0^2 \dfrac{1}{1+x^2} \, dx$. Give your answer

       correct to four decimal places.   **[7 marks]**

3.   Sketch the graph of parabola with vertex at (3, -1) and focus (5, -1). Hence find the

       equation of the parabola.   **[6 marks]**

4.   Determine the general solution of $\dfrac{dy}{dx} = 9x^2 y\sqrt{x^3 - 1}$. Hence state y in terms of x

       when $y(1) = 1$.   **[7 marks]**

5.   A circle passes through the points (1, -1) and (3, 5). Given that the line $y = -\dfrac{2}{3}x + \dfrac{7}{3}$

       passes through the center of the circle. Find the equation of the circle.   **[12 marks]**

6.   Find $\int 8x^2 e^{2x} dx$.   Hence find the volume of the solid generated when the region

       bounded by the curve $y = 5xe^x$ and the lines $x = 0, x = 1$ $y = 0$ is rotated through 2π

       about the x-axis.   **[12 marks]**

END OF QUESTION

Final Answer

1. $\dfrac{1}{2}\ln\left|e^{2x}+1\right|+C$

2. 1.1038

3. $(y+1)^2 = 8(x-3)$

4. $y = Ae^{2(x^3-1)^{\frac{3}{2}}}$; $y = e^{2(x^3-1)^{\frac{3}{2}}}$

5. $x^2 + y^2 + 2x - 6y - 10 = 0$

6. $2e^{2x}(2x^2 - 2x + 1) + C$; $\dfrac{25\pi}{4}(e^2 - 1)$ $unit^3$