St. Andrew's and St. Bride's High School

Advanced Higher Homework 13

1. Find the following indefinite integrals, in terms of x, simplifying your answers as far as possible:

(a) $\int \frac{2}{x^2 + 9}\, dx$ (b) $\int \frac{2x}{x^2 + 9}\, dx$

(c) $\int \frac{1}{\sqrt{(64 - 9x^2)}}\, dx$ (d) $\int \frac{1}{64 + 9x^2}\, dx$

(e) $\int \frac{9}{(x + 1)(x - 2)^2}\, dx$ (f) $\int \frac{7x^2 - 5x + 13}{(x - 1)(x^2 + 4)}\, dx$

2. Find the exact value of the volume generated by rotating about the x-axis, the area enclosed by the curve $y = \sin x$, the x-axis, $x = \frac{\pi}{4}$ and $x = \frac{\pi}{2}$.

3. Find the volume generated, by rotating one revolution about the y-axis, the area enclosed by the curve $y = 2x^2 + 3$ $(x > 0)$, the y-axis and the lines $y = 4$ and $y = 7$.