

MATH275-002
Eighth Written Assignment
Due as class time
Monday, 25 October

- (1) Determine the polar form of the equation

$$(x^2 + y^2)^2 + 2ax(x^2 + y^2) - a^2y^2 = 0$$

and sketch the graph of the curve. (When simplifying, you will get a factor which is a quadratic in r (and $\cos(\theta)$) which factors. Graph the factors.)

- (2) Sketch the graph of the polar equation

$$r^2 = 2a^2 \cos(2\theta)$$

- (3) Use polar coordinates to evaluate

$$\iint_S \sqrt{4 - x^2 - y^2} dA$$

where S is the first quadrant sector of the circle $x^2 + y^2 = 4$ between $x = 0$ and $x = y$.

- (4) Convert the following iterated integral to polar coordinates and evaluate:

$$\int_1^2 \int_0^{\sqrt{2x-x^2}} (x^2 + y^2)^{-1/2} dy dx$$

- (5) Evaluate the integral

$$\int_{-1}^1 \sqrt{\frac{1+x}{1-x}} dx$$

using the substitution

$$z^2 = \frac{1+x}{1-x}$$

(If you solve for x in terms of t you can easily find dx in terms of z and dz .)