Name:_____

Student Number:_____

Show all your work and give reasons for your answers. Good luck!

(1) Find the area bounded by the curves $y = x^2 - 2$ and $y = 2 - x^2$.

(2) Find the arc length of the graph of the curve given by the parametric equation $x = 2\cos(t)$, $y = 2\sin(t)$ for $0 \leq t \leq 1$.

(3) **Set up** an integral for the volume of revolution obtained by rotating the area bounded by the graph of the function $y = x^7 + x^3 + x + 1$, the x-axis and the lines $x = 0$ and $x = 1$ about the line:
 (a) $y = -5$,
 (b) $x = -5$.
Hint: You don't need to know the exact graph, just draw some function whose graph is contained between the lines $y = 0$ and $y = 4$ and satisfies $f(0) = 0$ and $f(1) = 4$.

(4) Give the radius **and** interval of convergence for the following series:

(a) $\sum_{n=1}^{n=\infty} \frac{(-1)^n x^n}{n^2}$.

(b) $\sum_{n=1}^{\infty} \frac{3^n x^n}{n!}$.

(5) (a) Find a power series for $f(x) = \frac{1}{1+x^2}$.
(b) For which values of x does this series converge?
(c) Use the above series to obtain a series for $\int_0^{1/10} \frac{1}{1+x^2}\, dx$.
(d) How many terms of the series are needed to estimate the above series with an error less than 10^{-7}?