University of The Outer Rim
Tuesday, November 9, 3:00 - 4:00 PM
MAT 186F TERM TEST
Calculus I
Duration: 60 minutes
No Study Aids and No Calculators Allowed

TOTAL MARKS: 30

NAME: _____

STUDENT NUMBER: _____

SIGNATURE: _____

TUTORIAL: _____   **TUTOR:** _____

Instructions: Present in ink your solutions to the following questions in the spaces provided; make sure that your method of finding the solutions is clear. You may use the back of each page for any rough work that you need to do.

1. Using Newton's method to approximate a solution of the equation $\cos x = x$ with the initial guess taken to be $x_0 = \pi/2$, what will be the next value, x_1, generated by the formula?

2. The closed curve $x^4 + y^4 = 1$ looks like a slightly squashed circle and surrounds a region R. Find the rectangle of largest area inscribed in the region R.

3. Given that $F(x) = \int_0^{x^2+2x} \sqrt{1 + t^{43}}dt$, find $F'(x)$.

4. The function $f(x) = \dfrac{x^2 - 2x - 2}{x - 3}$ is asymptotic to a line $y = mx + c$. Find m, c and sketch f over the range $[0, 5]$, indicating all local extrema.

5. Sketch the curve $y = |(x - 1)^3|$ and find the area under it, over the interval $[0, 2]$.

6. Given that $f(x) = x^3\sqrt{1 - x^4}$,

   (a) evaluate the integral of f over the interval $[0, 1]$

   (b) write down the *Mathematica* input required to compute this integral.

7. A vehicle travelling at $60\ m/s$ applies constant deceleration a and comes to a stop after travelling a further distance of $100\ m$. What was the constant deceleration?