Name: _____
Student ID: _____

Test 3

This test is graded out of 45 marks. No books, notes, graphing calculators or cell phones are allowed. You must show all your work, the correct answer is worth 1 mark the remaining marks are given for the work. If you need more space for your answer use the back of the page.

Question 1. *(5 marks)* Integrate the following indefinite integral:

$$\int_{\pi/3}^{\pi/4} x \csc^2 x \, dx$$

Question 2. *(5 marks)* Integrate the following indefinite integral:

$$\int \sin^4 x \, dx$$

Question 3. *(5 marks)* Integrate the following indefinite integral:

$$\int \frac{\sqrt{4-x^2}}{x}\, dx$$

Question 4. *(5 marks)* Integrate the following indefinite integral:

$$\int \frac{x-1}{x(x+1)^2}\,dx$$

Question 5. *(5 marks)* Evaluate the limit, using L'Hôpital's Rule if necessary.

$$\lim_{x \to \infty} \frac{x^2}{e^x}$$

Question 6. *(5 marks)* Solve the following improper integral:

$$\int_{-\infty}^{0} xe^{x}\,dx$$

Question 7. *(5 marks)* Solve the following improper integral:

$$\int^{1} 1_0 \frac{7}{(11-x)^3}\, dx$$

Question 8. *(5 marks)* Integrate the following indefinite integral:

$$\int \frac{1}{1-e^{3x}}\,dx$$

Question 9. *(5 marks)* Determine the convergence or divergence of the sequence with the given n^{th} term. If the sequence converges find its limit.

$$b_n = \left(1 + \frac{1}{n}\right)^n$$

Bonus Question. *(3 marks)*

$$\int \frac{\sqrt{1-x}}{\sqrt{x}}\, dx$$