

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:

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

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

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

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

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

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

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

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

$$\lim_{x \rightarrow \infty} (1+x)^{2/x}$$

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

$$\int_0^{\infty} x e^x dx$$

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

$$\int_0^1 \frac{9}{\sqrt{1-x}} dx$$

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

$$\int \frac{1}{e^{2x} - 1} dx$$

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.

$$b_n = \frac{n^2}{e^n}$$

Bonus Question. (3 marks)

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