

DAWSON COLLEGE
Mathematics Department
Final Examination – WITH ANSWERS
Calculus II
201-NYB-05 (REGULAR)
May 26, 2010

1. [28 marks]. Evaluate the following integrals

a) $\int x \sin(2x) dx$ (4 Marks)

$$-\frac{1}{2}x \cos(2x) + \frac{1}{4} \sin(2x) + c$$

b) $\int \frac{x}{(x-1)(x+1)^2} dx$ (6 Marks)

$$\frac{1}{4} \ln|x-1| - \frac{1}{4} \ln|x+1| - \frac{1}{2(x+1)} + c$$

c) $\int \tan(4x) \sec^3(4x) dx$ (4 Marks)

$$\frac{1}{12} \sec^3(4x) + c$$

d) $\int \frac{\sqrt{x}-1}{\sqrt{x}+1} dx$ (4 Marks)

$$(\sqrt{x}+1)^2 - 6(\sqrt{x}+1) + 4 \ln|\sqrt{x}+1| + c$$

3. (5 Marks) Find the area of the region bounded by the curves $y = x^2 - x$ and $y = 3x$ as shown in the figure.

Answer: $\frac{32}{3}$

4. (10 Marks) Find the volume of the solid generated when the region enclosed by the graphs of the functions $y = (x-1)^2$ and $y = x+1$

5. (5 Marks) Find the arc length of the graph of $y = n(\sec x)$, $0 \leq x \leq \frac{\pi}{4}$

$$\frac{\pi}{2} - \tan^{-1}(e)$$

Diverges by n^{th} term Test

11. (5 Marks) Find the Maclaurin polynomial of degree 3 for the function $f(x) = e^x \sin x$

$$x + x^2 + \frac{1}{3}x^3$$