MATH152 – 201, 202 **Practice problems for Test 2** **Fall 2014**

1. Evaluate the integral

   (a) $\displaystyle\int \frac{x^2dx}{(x-3)(x+2)^2}$

   (b) $\displaystyle\int \frac{x^4dx}{x^4-1}$

   (c) $\displaystyle\int \frac{x^4+1}{x(x^2+1)^2}dx$

   (d) $\displaystyle\int \frac{xdx}{x^2+x+1}$

2. Determine whether the integral is convergent. Evaluate those that are convergent.

   (a) $\displaystyle\int_0^\infty \frac{dx}{(x+2)(x+3)}$

   (b) $\displaystyle\int_0^\infty xe^{-x}\, dx$

   (c) $\displaystyle\int_1^{17} \frac{dx}{\sqrt[3]{x-9}}$

3. Find the length of the curve.

   (a) $y = \ln(\sin x)$, $\pi/6 \le x \le \pi/3$

   (b) $x = y^{3/2}$, $0 \le y \le 1$

   (c) $x = 3t - t^3$, $y = 3t^2$, $0 \le t \le 2$

4. Find the surface area of a torus.

5. Determine whether the sequence is convergent or divergent. If it is convergent, find its limit.

   (a) $a_n = \sin n$

   (b) $a_n = \dfrac{n}{\ln n}$

   (c) $a_n = \dfrac{\pi^n}{3^n}$

   (d) $a_n = \dfrac{n}{2n+5}$

   (e) $a_n = \sqrt{n+2} - \sqrt{n-1}$

6. Show that the sequence defined by $a_1 = 1$, $a_{n+1} = 3 - \dfrac{1}{a_n}$ is increasing and $a_n < 3$ for all n. Find its limit.