MATH 202 Quiz 8 – Version A

October 27, 2015

Name: ANSWERS

Instructions: No calculators! Use your own scrap paper and write your answers in the space provided.

1. Write down the partial fraction decomposition of the following. Do NOT solve for the arbitrary constants:

   (a) $\frac{2x^2-7}{x^3(x+1)(x^2-1)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{x+1} + \frac{E}{(x+1)^2} + \frac{F}{x-1}$

   (b) $\frac{4-3x^2}{(x^2+2x+2)(x+2)} = \frac{Ax+B}{x^2+2x+2} + \frac{C}{x+2}$

   (c) $\frac{7}{x^5-x^2} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x-1} + \frac{Dx+E}{x^2+x+1}$

   $x^2(x^3-1)$

2. Integrate the following:

   (a) $\int \frac{\sqrt{x}}{x-4}\, dx = 2(\sqrt{x} + \ln|\sqrt{x}-2| - \ln|\sqrt{x}+2|) + C$

   (b) $\int \frac{x}{(x+4)(2x-1)}\, dx = \frac{4}{9}\ln|x+4| + \frac{1}{18}\ln|2x-1| + C$

   (c) $\int \frac{3x-2}{x+1}\, dx = 3x - 5\ln|x+1| + C$

   (d) $\int \ln(x^2-3x+2)\, dx = (x-2)\ln|x-2| - (x-2) + (x-1)\ln|x-1| - (x-1) + C$

   (e) $\int \frac{e^{2x}}{e^{2x}-3e^x+2}\, dx = 2\ln|e^x-2| - \ln|e^x-1| + C$

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

Bonus:

1. In approximating the integral $\int_a^b f(x)\, dx$ with n subintervals, define what Δx is.

   $\Delta x = \frac{b-a}{n}$

2. Compute the integrals or state whether they are divergent:

   (a) $\int_1^e \frac{1}{2-x}\, dx =$ divergent

   (b) $\int_1^\infty \frac{1}{x^3}\, dx = 1/2$

3. Suppose we want to approximate the value of $\int_1^3 f(x)\, dx$ using the left hand rule. Write down what its approximation would look like if we used two subintervals.

   $\int_1^3 f(x)dx \approx L_2 = 1\cdot(f(1) + f(2))$

   (Note: the only thing you do not know here is the value of $f(x)$ at the points on the interval. Except for such points, everything else in your approximation should be constants.)