MATH 202 Quiz 8 – Version B

October 27, 2015

Name: ANSWERS

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

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

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

(e) $\frac{4-3x^2}{(x^2+4x+2)(x+1)} =$ $\frac{Ax+B}{x^2+4x+2} + \frac{C}{x+1}$

(f) $\frac{7}{x^4-x} =$ $\frac{A}{x} + \frac{B}{x-1} + \frac{Cx+D}{x^2+x+1}$

$x(x^3-1)$

4. Integrate the following:

(a) $\int \frac{\sqrt{x}}{x-9}\,dx =$ $2\sqrt{x} + 3\ln|\sqrt{x}-3| - 3\ln|\sqrt{x}+3| + C$ (b) $\int \frac{x}{(x+4)(2x+1)}\,dx =$ $\frac{4}{7}\ln|x+4| - \frac{1}{14}\ln|2x+1| + C$

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

(e) $\int \frac{e^{2x}}{e^{2x}-2e^x-3}\,dx =$ $\frac{3}{4}\ln|e^x-3| + \frac{1}{4}\ln|e^x+1| + C$ (f) $\int x\tan^{-1}x\,dx =$ $\frac{1}{2}(x^2+1)\tan^{-1}x - \frac{x}{2} + C$

Bonus:

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

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

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

(a) $\int_e^4 \frac{1}{x-3}dx =$ divergent (b) $\int_1^\infty \frac{1}{x^4}dx =$ $\frac{1}{3}$

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

$\int_1^3 f(x)dx \approx R_2 =$ $1\cdot(f(2) + f(3))$

(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.)