MAC 2312 (Calculus II) – Answers
QUIZ 6, Friday September 30, 2010

Name: **PID:**

Remember to show all your work; you won't get any credits if only your answers are shown without the steps leading to them.

---

1. [3] Write out the form of the partial fractions decomposition. (Dot not find the numerical values of the constants.)

$$\frac{x^4-7x^3+3x^2-11}{x^3(3x+8)(x^2+5)} = \frac{a}{x} + \frac{b}{x^2} + \frac{c}{x^3} + \frac{d}{3x+8} + \frac{fx+g}{x^2+5}$$

a, b, c, d, f, g are constants

0.5 for each

1 if both f and g are included
0 else.

---

2. [3] Evaluate the integral:

$$\int \frac{4x-7}{(x+2)(2x-5)}\,dx = \int \left(\frac{a}{x+2} + \frac{b}{2x-5}\right)dx \quad 0.5$$

$$= a\ln|x+2| + \frac{b}{2}\ln|2x-5| + C \quad 1.5 \text{ (0.5 for each term)}$$

Now $\frac{a}{x+2} + \frac{b}{2x-5} = \frac{a(2x-5)+b(x+2)}{(x+2)(2x-5)} = \frac{4x-7}{(x+2)(2x-5)}$; So $a(2x-5)+b(x+2) = 4x-7$. If $x=-2$, we find $a(-4-5) = -8-7$; $a = 15/9 = 5/3$. If $x = 5/2$, we find $b(\frac{5}{2}+2) = 10-7 = 3$; $b = 6/9 = 2/3$. 0.5 for each of a & b

---

3. [4] Decide whether the improper integral converges or diverges. If it converges, state the value where it converges. If it diverges, state whether it diverges to $+\infty$ or $-\infty$, or due to oscillations.

a) $\int_0^{+\infty} e^{-2x}\,dx = \lim_{R\to+\infty} \int_0^R e^{-2x}dx$ 0.5 $= \lim_{R\to+\infty} -\frac{e^{-2x}}{2}\Big]_0^R$ 0.5 $= -\lim_{R\to+\infty}\frac{e^{-2R}}{2} + \frac{1}{2}$ 0.25
$= 0 + \frac{1}{2}$ 0.5
$= \frac{1}{2}$; It converges to $\frac{1}{2}$ 0.25

b) $\int_{-3}^{1} \frac{dx}{x+3} = \lim_{r\to-3^+}\int_r^1 \frac{dx}{x+3}$ 0.5 $= \lim_{r\to-3^+} \ln(x+3)\Big]_r^1$ 0.5
$= \ln(4) - \lim_{r\to-3^+}\ln(r+3)$ 0.25
$= \ln(4) - \lim_{u\to0^+}\ln(u)$, $u = r+3$
$= \ln(4) - (-\infty)$ 0.5
$= +\infty$ 0.25; It diverges to $+\infty$ 0.25