Key

Quiz 8

This is a 2-stage quiz. During the 1st stage, use your knowledge, a one-sided sheet of notes & calculator. You have 15 min. In the 2nd stage, you are now welcome to use your books, notes, and students in the class to retake the same quiz. You have the remainder of the quiz time to write one solution (with everyone's name on it!!!) to be turned in for the group.

Show *all* your work. Reasonable supporting work must be shown for any partial credit.

1. [6] Recall the four steps described in class for integrating rational functions:

Rational Functions Activity

   (a) Use long division to convert the integrand into a 'proper rational form'
   (b) Factor the denominator into linear and quadratics.
   (c) Write the integrand as partial fractions.
   (d) Integrate using algebra, substitutions, ln, and arctan.

   For the integrals below identify which step needs to be done next and set up. For example, if step 1 is needed set up the long division, but do not actually do it. If step 2 is needed, indicate how you will find the factors. If step 3 is needed provide the form of the partial fractions and if step 4 is needed indicate which tool you will use for the integration.

§7.4 #70 Partial fr. set up is correct +1

(a) $\int \frac{\pi}{(x^2+3x+2)^2}\,dx.$ Step b/2 (+1) $\int \left[\frac{\pi}{(x+1)(x+2)}\right]^2 dx$

find $(x+a)(x+b)$ where $a+b=3$ and $a\cdot b=2$ (+1)

Worksheet #3

(b) $\int \frac{x^5}{x^2-9}\,dx.$ Step a/1 (+1) step d/1 (+1)

$$x^2-0x-9 \;\overline{)\; x^5+0x^4+0x^3+0x^2+0x+0}$$
$$-(x^5-0x^4-9x^3)$$
$$9x^3$$
$$x^3+9x$$

Rational Function Activity

(c) $\int \frac{4x}{x^2-9}\,dx.$ Step a/1 ✓ step b/2 (+1) $\Rightarrow \int \frac{4x}{(x+3)(x-3)}\,dx$ (+1)

or can use step d/4 (+1) w/ substitution (+1)

$u = x^2-9$, $du = 2x\,dx$, $\frac{1}{2}du = x\,dx$

$$\int \frac{4}{u}\,x\,dx = \int \frac{4}{u}\,\frac{1}{2}\,du = 2\int \frac{1}{u}\,du$$

2. [4] Consider $\int \frac{x^5+36}{x(x-1)(x^2+6)^2}\,dx$. Write out the form of the partial fraction decomposition for the integrand above.

Worksheet 7.4 #2

Want to find A, B, C, D, E & F so that constants (+1)

$$\int \frac{x^5+36}{x(x-1)(x^2+6)^2}\,dx = \int \frac{A}{x} + \frac{B}{x-1} + \frac{Cx+D}{x^2+6} + \frac{Ex+F}{(x^2+6)^2}\,dx$$

linear (+.5) linear (+.5) (+.5) (+.5) (+.5) (+.5)