

MATH 202 Quiz 7 – Version A

October 20, 2015

Name: ANSWERS

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

1. Simplify or perform the long division:

(a) $\frac{x^3-4}{x+2} = x^2 - 2x + 4 - \frac{12}{x+2}$ (b) $\frac{x^2+3x+1}{x^2-3} = 1 + \frac{3x+4}{x^2-3}$

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

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

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

(c) $\frac{7}{x^6+x^3} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{x+1} + \frac{Ex+F}{x^2-x+1}$
 $x^3(x^3+1)$

3. Complete the following table of trig substitutions:

Expression	Substitution	Identity
$\sqrt{a^2 - x^2}$	$x = a \sin \theta$ or $x = a \cos \theta$	$1 - \sin^2 \theta = \cos^2 \theta$ or $1 - \cos^2 \theta = \sin^2 \theta$
$\sqrt{a^2 + x^2}$	$x = a \tan \theta$	$1 + \tan^2 \theta = \sec^2 \theta$
$\sqrt{x^2 - a^2}$	$x = a \sec \theta$	$\sec^2 \theta - 1 = \tan^2 \theta$

4. Integrate the following:

(a) $\int \frac{x^2 - 3x + 1}{x^2 + 1} dx = x - \frac{3}{2} \ln|x^2+1| + C$ (b) $\int \frac{x^3}{\sqrt{3+x^2}} dx = \frac{(3+x^2)^{3/2}}{3} - 3\sqrt{3+x^2} + C$

(c) $\int \sqrt{1 + \cos 2x} dx = \sqrt{2} \sin x + C$ (d) $\int \frac{1}{x^2 - 3x + 2} dx = \ln|x-2| - \ln|x-1| + C$

(e) $\int \frac{x^2}{x-1} dx = \frac{x^2}{2} + x + \ln|x-1| + C$ (f) $\int \sqrt{3-4x^2} dx = \frac{3}{4} \left(\sin^{-1} \left(\frac{2x}{\sqrt{3}} \right) + \frac{2x\sqrt{3-4x^2}}{3} \right) + C$

Bonus:

1. $\int \frac{\sqrt{x}}{x-4} dx = 2(\sqrt{x} + \ln|\sqrt{x}-2| - \ln|\sqrt{x}+2|) + C$ (b) $\int \frac{\sin x}{\cos^2 x - 3 \cos x} dx = \frac{1}{3} (\ln|\cos x| - \ln|\cos x - 3|) + C$

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

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