MATH 230 NAME:
7.4

Directions: Show all work on a separate sheet of paper for full credit.

1. Write out the form of the partial fraction decomposition of the given function. DO NOT FIND THE VALUE OF THE COEFFICIENTS.

   (a) $\dfrac{4+x}{(1+2x)(3-x)}$ $\qquad \dfrac{A}{1+2x}+\dfrac{B}{3-x}$

   (b) $\dfrac{1-x}{x^3+x^4}$ $\qquad \dfrac{A}{x}+\dfrac{B}{x^2}+\dfrac{C}{x^3}+\dfrac{D}{1+x}$

   (c) $\dfrac{x^3+1}{x^3-3x^2+2x}$ $\qquad 1+\dfrac{A}{x}+\dfrac{B}{x-1}+\dfrac{C}{x-2}$

   (d) $\dfrac{1}{x^2+x^4}$ $\qquad \dfrac{A}{x}+\dfrac{B}{x^2}+\dfrac{Cx+D}{1+x^2}$

   (e) $\dfrac{x^4}{(x^2-x-1)(x^2+2)^2}$ $\qquad \dfrac{Ax+B}{x^2-x+1}+\dfrac{Cx+D}{x^2+2}+\dfrac{Ex+F}{(x^2+2)^2}$

2. Evaluate the integral

   (a) $\displaystyle\int \frac{5x+1}{(2x+1)(x-1)}\,dx$ $\qquad \dfrac{1}{2}\ln|2x+1|+2\ln|x-1|+C$

   (b) $\displaystyle\int \frac{y}{(y+4)(2y-1)}\,dy$ $\qquad \dfrac{4}{9}\ln|y+4|+\dfrac{1}{18}\ln|2y-1|+C$

   (c) $\displaystyle\int_0^1 \frac{2}{2x^2+3x+1}\,dx$ $\qquad 2\ln 3-2\ln 2$

   (d) $\displaystyle\int \frac{4y^2-7y-12}{y(y+2)(y-3)}\,dy$ $\qquad \dfrac{27}{5}\ln 2-\dfrac{9}{5}\ln 3$

   (e) $\displaystyle\int_0^1 \frac{x^2+x+1}{(x+1)^2(x+2)}\,dx$ $\qquad \dfrac{1}{2}-5\ln 2+3\ln 3$

   (f) $\displaystyle\int \frac{x^2-x+6}{x^3+3x}\,dx$ $\qquad 2\ln|x|-\dfrac{1}{2}\ln|x^2+3|-\dfrac{1}{\sqrt{3}}\tan^{-1}\left(\dfrac{x}{\sqrt{3}}\right)+C$