MAC 2312 QUIZ 3
SPRING 2012

Name _____
Sect # _____
UF ID _____

SHOW ALL WORK TO RECEIVE FULL CREDIT.

1. (2.5 points) Decompose to partial fractions: $f(x) = \dfrac{1-6x}{x^2(x+1)}$.

2. (2.5 points) Find $\displaystyle\int \frac{x-4}{x^2+9}dx$.

Solution:

1.
$$\frac{1-6x}{x^2(x+1)} = \frac{A}{x+1}+\frac{B}{x}+\frac{C}{x^2}$$
$$1-6x = Ax^2+Bx(x+1)+C(x+1).$$

Let $x=-1$: $7=A$.

Let $x=0$: $1=C$.

Let $x=1$: $-5=A+2B+2C$, thus $B=-7$.

So $\dfrac{1-6x}{x^2(x+1)} = \dfrac{7}{x+1}-\dfrac{7}{x}+\dfrac{1}{x^2}$.

2.
$$\begin{aligned}\int \frac{x-4}{x^2+9}dx &= \int \frac{x}{x^2+9}dx - \int \frac{4}{x^2+9}dx \\ &\overset{(u=x^2+9)}{=} \int \frac{\frac{1}{2}du}{u} - 4\int \frac{dx}{x^2+3^2} \\ &= \frac{1}{2}\ln|u| - 4\cdot\frac{1}{3}\arctan\frac{x}{3}+C \\ &= \frac{1}{2}\ln(x^2+9) - \frac{4}{3}\arctan\frac{x}{3}+C.\end{aligned}$$