Quiz 4

Name: _Key_

Math 201 F01   02/15/12

Compute the following indefinite integrals:

1. $\displaystyle\int \frac{1}{\sqrt{10x - x^2}}\, dx$

$10x - x^2 = -(x^2 - 10x + 25) + 25$

$\qquad = 25 - (x-5)^2$

$= \displaystyle\int \frac{1}{\sqrt{25\left(1-\left(\frac{x}{5}-1\right)^2\right)}}\, dx \qquad = 25\left(1 - \frac{(x-5)^2}{5^2}\right)$

$\qquad\qquad = 25\left(1 - \left(\frac{x}{5}-1\right)^2\right)$

$= \dfrac{1}{5}\displaystyle\int \frac{1}{\sqrt{1-\left(\frac{x}{5}-1\right)^2}}\, dx$

$= \arcsin\left(\dfrac{x}{5}-1\right) + C$

2. $\displaystyle\int x^2 \ln x\, dx \;=\; \dfrac{1}{3}x^3 \ln x - \int \dfrac{x^3}{3}\cdot\dfrac{1}{x}\, dx = \dfrac{1}{3}x^3 \ln x - \dfrac{1}{3}\int x^2\, dx$

$u = \ln x \qquad du = \dfrac{1}{x}\, dx$

$dv = x^2\, dx \qquad v = \dfrac{x^3}{3}$

$= \dfrac{1}{3}x^3 \ln x - \dfrac{1}{9}x^3 + C$