Name: _____

1. Class notes for this week: This week we have had exam review and covered Section 4.4. Next week we will cover Sections 5.5 and 4.5. I will be out of town on Monday; Professor Gerhardt will teach your class. Office hours will be W 10-11, W 2-3, and R 3-4. Midterm grade reports will be distributed Wednesday in class.

2. (a) (1 point) Find the indefinite integral

$$\int \frac{1+\cos^2\theta}{\cos^2\theta}d\theta$$

(b) (1 point) Find the definite integral

$$\int_0^{\frac{\pi}{4}} \frac{1+\cos^2\theta}{\cos^2\theta}d\theta$$

(c) (1 point) Find the definite integral

$$\int_1^{64} \frac{1+x^{\frac{1}{3}}}{\sqrt{x}}dx$$

(a) $\int \frac{1+\cos^2\theta}{\cos^2\theta}d\theta = \int [\sec^2\theta + 1]d\theta = \tan\theta + \theta + C$

(b) $\int_0^{\pi/4} \frac{1+\cos^2\theta}{\cos^2\theta}d\theta = \tan\theta + \theta \Big]_0^{\pi/4} = (\tan\pi/4 + \pi/4) - (\tan 0 + 0) = 1 + \pi/4$

(c) $\int_1^{64} \frac{1+x^{1/3}}{\sqrt{x}}dx = \int_1^{64} (x^{-1/2} + x^{-1/6})dx$

$= \left[2x^{1/2} + \frac{6}{5}x^{5/6}\right]_1^{64}$

$= \left[2\sqrt{64} + \frac{6}{5}(64)^{5/6}\right] - \left[2 + \frac{6}{5}\right]$

$= 2(8) + \frac{6}{5}(32) - 2 - \frac{6}{5}$

$= 14 + \frac{31(6)}{5} = \frac{256}{5}$

Question 3 is on the back

3. (2 points) Suppose you know that the acceleration of a particle is $a(t) = t + 2$ and its initial velocity is $v(0) = 3$. How far does the particle travel over the time interval $0 \leq t \leq 6$?

$a(t) = t + 2$

$v(t) = \frac{1}{2}t^2 + 2t + C$

But $v(0) = 3$, so $v(t) = \frac{1}{2}t^2 + 2t + 3$

Change in position $s(6) - s(0) = \int_0^6 s'(t)\,dt$

$= \int_0^6 v(t)\,dt$

$= \int_0^6 \left[\frac{1}{2}t^2 + 2t + 3\right] dt$

$= \left[\frac{1}{6}t^3 + t^2 + 3t\right]_0^6$

$= [36 + 36 + 18] - [0]$

$= 90$