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
   \[ \int_0^\pi \frac{1 + \cos^2 \theta}{\cos^2 \theta} d\theta \]

(c) (1 point) Find the definite integral
   \[ \int_1^{64} \frac{1 + x^{\frac{3}{2}}}{\sqrt{x}} dx \]

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

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

(c) \[ \int_1^{64} \frac{1 + x^{\frac{3}{2}}}{\sqrt{x}} dx = \int_1^{64} (x^{-\frac{1}{2}} + x^{-\frac{1}{6}}) dx \]
   \[ = \left[ 2x^{\frac{1}{2}} + \frac{x^{\frac{5}{6}}}{\frac{5}{6}} \right]_1^{64} \]
   \[ = \left[ 2\sqrt{64} + \frac{64^{\frac{5}{6}}}{\frac{5}{6}} \right] - \left[ 2\sqrt{1} + \frac{1^{\frac{5}{6}}}{\frac{5}{6}} \right] \]
   \[ = 2(8) + \frac{64^{\frac{5}{6}}}{\frac{5}{6}} - 2 - \frac{1}{\frac{5}{6}} \]
   \[ = 16 + \frac{64^{\frac{5}{6}}}{\frac{5}{6}} - 2 - \frac{6}{5} \]
   \[ = 14 + \frac{312}{5} \]

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 \( 0 \leq t \leq 6 \)?

\[
\begin{align*}
\text{ acceleration: } & a(t) = t + 2 \\
\text{ velocity: } & v(t) = \frac{1}{2}t^2 + 2t + C \\
\text{ but } v(0) = 3, \quad \text{so } v(t) = \frac{1}{2}t^2 + 2t + 3
\end{align*}
\]

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

\[
\begin{align*}
= \int_0^6 v(t) \, dt \\
= \int_0^6 \left[ \frac{1}{2}t^2 + 2t + 3 \right] \, dt \\
= \left[ \frac{1}{6}t^3 + t^2 + 3t \right]_0^6 \\
= \left[ 36 + 36 + 18 \right] - [0] \\
= 90
\end{align*}
\]