Problem 1. (10 points)
True or False: If $F(x)$ is an antiderivative of $f(x)$ with respect to $x$, then $F'(x) = f(x)$.

True

False

Problem 2. (40 points) Show all work.
The radius of a beach ball is increasing at a rate of 2 inches per second. How fast is the volume of the ball increasing when the ball has a radius of 10 inches. Note: the volume of a ball is given by $V = \frac{4}{3}\pi r^3$. 

See other side for more problems.
Problem 3. (35 points) Show all work.

A cylindrical soda can with radius \( r \) and height \( h \) must have a volume of \( 16\pi \). Find values for \( r \) and \( h \) which minimizes the surface area of the can. Note: the surface area of a cylinder is given by \( S = 2\pi r^2 + 2\pi rh \) and the volume of the cylinder is given by \( V = \pi r^2 h \).

Problem 4. (15 points) If \( f(x) = 4x^3 + \sin(x) \), which of these is the indefinite integral of \( f(x) \), where \( C \) is a constant.

a) \( 12x^2 + \cos(x) + C \)

b) \( x^2 - \cos(x) + C \)

c) \( x^4 - \cos(x) + C \)

d) \( x^4 + \cos(x) + C \)

e) \( \frac{4x^4}{3} - \cos(x) + C \)