

MTH 252 Lesson 4 - The Indefinite Integral and Antiderivatives

1. Evaluate the following indefinite integrals.

a. $\int 9x + 2 \, dx$

e. $\int \theta + \sec^2(\theta) \, d\theta$

b. $\int z^{-4/5} - z^{2/3} + z^{5/4} \, dz$

f. $\int \sec(x) \tan(x) \, dx$

c. $\int \frac{12 - z}{\sqrt{z}} \, dz$

g. $\int \frac{4}{x} - e^x \, dx$

d. $\int \frac{1}{3} \sin(x) - \frac{1}{4} \cos(x) \, dx$

h. $\int 8x - 4e^{5-2x} \, dx$

2. Solve the initial value problem $\frac{dy}{dt} = t^{-3/2}$, $y(4) = -1$

3. Solve the initial value problem $\frac{dy}{dt} = (4t + 3)^{-2}$, $y(1) = 0$

4. Solve the initial value problem $f''(x) = x^3 - 2x$, $f'(1) = 0$, $f(1) = 2$

5. Suppose a ball is dropped and it falls for 2 seconds before hitting the ground. Determine how far it falls, assuming an acceleration of gravity of -9.8 m/s^2 and no wind resistance.