Homework 3.6 – Integrals of Polynomials

1. **(1 pt) alfredLibrary/AUCI/chapter3/lesson6/anti1.pg**

Evaluate the indefinite integral using the power rule for integration:

$$\int 5s^4 - 5s^5\, ds = \_\_\_\_\_.$$

2. **(1 pt) alfredLibrary/AUCI/chapter3/lesson6/anti4.pg**

Evaluate the indefinite integral by writing each term as a power function and then using the power rule:

$$\int \frac{4}{x^5} - 7\sqrt[3]{x^2}\, dx = \_\_\_\_\_.$$

3. **(1 pt) alfredLibrary/AUCI/chapter3/lesson6/IVP1pet.pg**

Recall that $\int f(x)dx$ represents the infinite family of antiderivatives of f, each identified by its constant of integration, C. Given a point in the plane, we could find the constant C that identifies the unique member of the family passing through the given point.

Consider the function $f(x) = \frac{2}{x^3} - \frac{6}{x^5}$, and suppose $F(x)$ is the antiderivative of $f(x)$ such that $F(1) = 0$ (i.e., the graph passes through the point $(1, 0)$). Then

$F(x) =$ _____

4. **(1 pt) alfredLibrary/AUCI/chapter3/lesson6/anti4pet.pg**

Use the fundamental theorem of calculus to evaluate the definite integral.

$$\int_3^9 \frac{10}{\sqrt{x}}\, dx = \_\_\_\_\_ \Big| \_\_\_\_\_ = \_\_\_\_\_$$

5. **(1 pt) alfredLibrary/AUCI/chapter3/lesson6/definite11pet.pg**

Suppose an object is moving along a line with velocity $v(t) = -t^2 + 7t - 12$ miles per hour. Find the displacement and the total distance traveled by the object during the time interval $[2, 11]$.

Displacement = _____ miles

Total distance traveled = _____ miles

HINT: To compute the total distance traveled, you must integrate the speed, which is $|v(t)|$. To do this, you must find the zeros of v on the interval $[2, 11]$, and then find the intervals on which the velocity is positive or negative by performing a sign test. By the definition of absolute value, $|v(t)| = v(t)$ when the velocity is positive, and $|v(t)| = -v(t)$ when velocity is negative. It may help to view a graph.