

6.1 – 6.2 Graded Assignment – Antiderivatives and Differential Equations

AP Calculus AB

Name: _____ Date: _____ Pd: _____

No calculator may be used on this assessment. Show all work for full credit.

1. Evaluate each of the following integral expressions.

a. $\int \left(7x - 1 + \frac{3}{x}\right) dx$

c. $\int (e^{3t} - 2e^{-2t}) dt$

b. $\int 6 \csc^2 6t dt$

d. $\int_1^{64} \left(\frac{2}{3}v^{-1/3} - \frac{1}{\sqrt{v}} - \frac{1}{v^{3/2}}\right) dv$

2. Water is being drained from a conical tank with a radius of 3 ft and a height of 6 ft, which was initially filled with water to a height of 4 ft. The rate at which the amount of water is changing is given by

$$\frac{dV}{dt} = -\frac{1}{3}\sqrt{t}. \quad \left(V = \frac{\pi}{3}r^2h\right)$$

a. What is the volume of water in the tank after 9 minutes of draining?

b. What is the rate change of the height after 4 minutes of draining?

3. Evaluate each of the following integral expressions.

a. $\int g^2(1 - 2g^3)^3 dg$

b. $\int_0^{\pi/4} 2 \sin(3t) dt$

4. A particle is moving along the x axis with a velocity given by $v(t) = t\sqrt{4 - t^2}$ for $0 \leq t \leq 2$. Find the total distance traveled by the particle on $0 \leq t \leq 2$.

5. Consider the differential equation $\frac{dy}{dx} = -(x - 1)y^3$ with the initial condition $y(1) = 3$.

a. Sketch the slope field for the differential equation below.

b. Find the particular solution $y = f(x)$ to the given differential equation with $f(1) = 3$.

