Name____ Date_______________________ Period______

Worksheet 4.1—Antidifferentiation & Integration
Show all work. No Calculator

Multiple Choice

1. If $f'(x) = 12x^2 - 6x + 1$, $f(1) = 5$, then $f(0)$ equals

(A) 2 (B) 3 (C) 4 (D) –1 (E) 0

2. Find all functions g such that $g'(x) = \dfrac{5x^2 + 4x + 5}{\sqrt{x}}$

(A) $g(x) = 2\sqrt{x}\left(x^2 + \frac{4}{3}x - 5\right) + C$ (B) $g(x) = 2\sqrt{x}\left(x^2 + \frac{4}{3}x + 5\right) + C$

(C) $g(x) = 2\sqrt{x}\left(5x^2 + 4x - 5\right) + C$ (D) $g(x) = \sqrt{x}\left(x^2 + \frac{4}{3}x + 5\right) + C$

(E) $g(x) = \sqrt{x}\left(5x^2 + 4x + 5\right) + C$

3. Determine $f(t)$ when $f''(t)=2(3t+1)$ and $f'(1)=3$, $f(1)=5$.

(A) $f(t)=3t^3-2t^2+2t+2$ (B) $f(t)=t^3-2t^2+2t+4$

(C) $f(t)=3t^3+t^2-2t+3$ (D) $f(t)=t^3-t^2+2t+3$

(E) $f(t)=t^3+t^2-2t+5$

4. Consider the following functions:

I. $F_1(x)=\dfrac{\sin^2 x}{2}$

II. $F_2(x)=-\dfrac{\cos 2x}{4}$

III. $F_3(x)=-\dfrac{\cos^2 x}{2}$

Which are antiderivatives of $f(x)=\sin x\cos x$? (Hint: take the derivative of each and manipulate)

(A) II only (B) I only (C) I & III only (D) I, II, & III (E) I & II only

5. A particle moves along the x-axis so that its acceleration at time t is $a(t)=8-8t$ in units of feet and seconds. If the velocity of the particle at $t=0$ is 12 ft/sec, how many seconds will it take for the particle to reach its furthest point to the right?

(A) 6 seconds (B) 5 seconds (C) 3 seconds (D) 7 seconds (E) 4 seconds

Free Response

6. Evaluate the following:

(a) $\int\left(\sqrt{x^3}+2x+1\right)dx$ (b) $\int\left(\dfrac{x^3+2x-3}{x^4}\right)dx$ (c) $\int\left(2t^2-1\right)^2\,dt$

(d) $\int\left(\theta^2+\sec^2\theta-\csc\theta\cot\theta\right)d\theta$ (e) $\int\left(\dfrac{\cos x}{1-\cos^2 x}\right)dx$ (f) $\int\left(\cos x+3^x\right)dx$

7. Solve the following differential equations. Find the general solution, then find the particular solution using the initial condition.

(a) $f'(x) = 4x$, $f(0) = 6$ (b) $h'(t) = 8t^3 + 5$, $h(1) = -4$ (c) $f''(x) = 2$, $f'(2) = 5$, $f(2) = 10$

(d) $f''(x) = x^{-3/2}$, $f'(4) = 2$, $f(0) = 0$ (e) $f''(x) = \sin x$, $f'(0) = 1$, $f(0) = 6$