

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 $g'(x) = \frac{5x^2 + 4x + 5}{\sqrt{x}}$
(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. $F_1(x) = \frac{\sin^2 x}{2}$

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

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

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) $\int (\sqrt{x^3} + 2x + 1) dx$

(b) $\int \left(\frac{x^3 + 2x - 3}{x^4} \right) dx$

(c) $\int (2t^2 - 1)^2 dt$

(d) $\int (\theta^2 + \sec^2 \theta - \csc \theta \cot \theta) d\theta$

(e) $\int \left(\frac{\cos x}{1 - \cos^2 x} \right) dx$

(f) $\int (\cos x + 3^x) dx$

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) $f''(x) = \sin x$, $f'(0) = 1$, $f(0) = 6$