Antiderivatives

Solutions should show all of your work, not just a single final answer.

1. Find the most general antiderivative of the function (use C as any constant).

   (a) $f(x) = \dfrac{1}{2} + \dfrac{3}{4}x^2 - \dfrac{4}{5}x^3$

   (b) $f(x) = \dfrac{10}{x^9}$ for $x > 0$

   (c) $f(x) = \dfrac{x^4 + 3\sqrt{x}}{x^2}$ for $x > 0$

   (d) $f(x) = \cos x - 5\sin x + e^x$

   (e) $f(x) = e^2$

   (f) $f(x) = 7x^{2/5} + 8x^{-4/5}$ for $x > 0$

2. Find a function $f(x)$ satisfying the given conditions.

   (a) $f'''(x) = \cos x$, $f(0) = 1$, $f'(0) = 2$, and $f''(0) = 3$

   (b) $f''(x) = 2 - 12x$, $f(0) = 9$, $f(2) = 7$

3. A particle moves along a line according to the following information about its position $s(t)$, velocity $v(t)$, and acceleration $a(t)$. Find the particle's position function $s(t)$ for general t.

   (a) $v(t) = 1.5t^2 + 4t$, $s(4) = 50$

   (b) $a(t) = 3\cos t - 2\sin t$, $s(0) = 0$, $v(0) = 4$

4. T/F (with justification) The antiderivative of $\cos(x^2)$ is $\sin(x^2) + C$.