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# Antiderivatives

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

(b)  $f(x) = \frac{10}{x^9}$

(c)  $f(x) = \frac{x^4 + 3\sqrt{x}}{x^2}$

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

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

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

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 is moving with the given data. Find the position function  $s(t)$  of the particle.

(a)  $v(t) = 1.5\sqrt{t}$ ,  $s(4) = 10$

(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  $\sin(x^2) + C$ .