

Simplify by combining like terms whenever possible.

$$1. f(x) = \frac{x^4}{2} + \frac{x^{-1}}{x^1} + 3x - 500$$

$$a. f'(x) = 2x^3 - 2x^{-3} + 3$$

$$b. f'(2) = 16 - \frac{1}{4} + 3 = \frac{75}{4}$$

$$2. y = \frac{-1}{x^2} - \cos x + \frac{\sqrt{x}}{\sqrt[3]{x}}$$

$$y' = \frac{2}{x^3} + \sin x + \frac{1}{6\sqrt{x^5}}$$

$$3. y = \frac{\sin x}{3} - 5 \cos x + \frac{5x}{\sqrt[4]{x^5}}$$

$$y' = \frac{\cos x}{3} + 5 \sin x - \frac{5}{4\sqrt[4]{x^5}}$$

$$4. f(x) = \sqrt{x} - \frac{4}{\sqrt[4]{x}} + 2x - \frac{3x}{\sqrt{x}}$$

$$f'(x) = -\frac{1}{\sqrt{x}} + \frac{1}{\sqrt[4]{x^5}} + 2$$

$$5. y = \frac{4}{x} - \frac{1}{x^3} - \frac{8}{x^8}$$

$$a. y' = -\frac{4}{x^2} + \frac{3}{x^4} + \frac{64}{x^9}$$

$$b. y'(2) = -\frac{11}{16}$$

$$6. f(x) = \frac{\sqrt{x}}{3x} - \frac{x^4 + 2x^{\frac{3}{2}} - 4x}{x^{\frac{3}{2}}}$$

$$a. f'(x) = -\frac{1}{6x^{\frac{3}{2}}} - \frac{5x^{\frac{3}{2}}}{2} - \frac{2}{x^{\frac{3}{2}}}$$
$$= -\frac{13}{6x^{\frac{3}{2}}} - \frac{5x^{\frac{3}{2}}}{2}$$

$$b. f'(1) = -\frac{14}{3}$$