

$$A1. \lim_{x \rightarrow 0} \frac{\left(\frac{1}{x+3} - \frac{1}{3}\right)}{x} = -\frac{1}{9}$$

$$A2. \lim_{x \rightarrow 0} \frac{(\sqrt{x+4} - 2)}{x} = \frac{1}{4}$$

$$A3. f(x) := \begin{cases} x^2 + 1 & x \leq 0 \\ 2x - 3 & x > 0 \end{cases}$$

$$f(0) = 1 \quad \lim_{x \rightarrow 0} f(x) = \text{undefined}$$

$$f(4) = 5 \quad \lim_{x \rightarrow 4} f(x) = 5$$

$$A4. \frac{d}{dx} \left( (x^2 - 1) (\sqrt{x^3 - 2}) \right) =$$

$$2x\sqrt{x^3 - 2} + \frac{3}{2} \frac{(x^2 - 1)x^2}{\sqrt{x^3 - 2}}$$

$$A5. \frac{d}{dx} \left( \frac{3x}{x^2 + 1} \right)^4 = 4 \left( \frac{3x}{x^2 + 1} \right)^3 \left( \frac{-3x^2 + 3}{(x^2 + 1)^2} \right)$$

$$= -\frac{324x^3(x^2 - 1)}{(x^2 + 1)^5}$$

$$A6. \frac{d}{dx} (\sin^2(3x)) = 6 \sin(3x) \cos(3x)$$

$$A7. \frac{dy}{dx} = -\frac{1+2y}{2x+1}$$

$$A8. \int (x^2 (5x^3 + 9)^4) dx = \frac{1}{75} (5x^3 + 9)^5 + c$$

$$A9. \int_0^6 \frac{1}{\sqrt{2x+1}} dx = \sqrt{13} - 1$$

$$A10. \int x\sqrt{x+1} dx =$$

$$\frac{2}{5}(x+1)^{\frac{5}{2}} - \frac{2}{3}(x+1)^{\frac{3}{2}} + c$$

$$B1. \lim_{x \rightarrow 4} \frac{\left(\frac{1}{x-2} - \frac{1}{2}\right)}{x-4} = -\frac{1}{4}$$

$$B2. \lim_{x \rightarrow 3} \frac{(\sqrt{x+6} - 3)}{x-3} = \frac{1}{6}$$

$$B3. f(x) := \begin{cases} 3x + 2 & x < 1 \\ 2x^2 - 3x + 6 & x \geq 1 \end{cases}$$

$$f(1) = 5 \quad \lim_{x \rightarrow 1} f(x) = 5$$

$$f(-2) = -4 \quad \lim_{x \rightarrow -2} f(x) = -4$$

$$B4. \frac{d}{dx} (\cos(x^2) \sin(\pi x)) =$$

$$-2 \sin(x^2) x \sin(\pi x) + \cos(x^2) \cos(\pi x) \pi$$

$$B5. \frac{d}{dx} \frac{\tan(3x^2)}{4x^3} =$$

$$\frac{(4x^3)\sec^2(3x^2)(6x) - \tan(3x^2)(12x^2)}{(4x^3)^2}$$

$$B6. \frac{d}{dx} (4(\cot(3x^2))^7) =$$

$$28(\cot(3x^2))^6 (-\csc^2(3x^2))(6x)$$

$$B7. \frac{d^2y}{dx^2} = -\frac{4}{y^3}$$

$$B8. \int \sec^3(3x) \tan(3x) dx = \frac{1}{9} \sec(3x)^3 + c$$

$$B9. \int_0^\pi (x \cos(\pi x^2)) dx = \frac{1}{2} \frac{\sin(\pi^3)}{\pi} = -0.063430$$

$$B10. \int_0^3 (x(x+1)^{12}) dx = \frac{2550136833}{182} = 14,011,740.84$$

$$\text{B11. } \int \frac{(x^3 + 8)}{(x + 2)} dx = \frac{1}{3}x^3 - x^2 + 4x$$

$$\text{B12. } \lim_{x \rightarrow 25} \frac{(\sqrt{x} - 5)}{25 - x} = -\frac{1}{10}$$

$$\text{B13. } \frac{d}{dx} [(3x^3 - 7x)^3] = [3(3x^3 - 7x)^2(9x^2 - 7)]$$

$$\text{A11. } \frac{d}{dx} \left[ \frac{4}{x^2} - 3x \sin(2x) \right] = \\ \left[ -\frac{8}{x^3} - 3 \sin(2x) - 6x \cos(2x) \right]$$

$$\text{A12. } \frac{dy}{dx} = \frac{\sin(x - y)}{\sin(x - y) - 1}$$

$$\text{A13. } \int x \sqrt{(3x^2 - 7)} dx = \frac{1}{9} (3x^2 - 7)^{3/2} + c$$