

$$11. V(r) = \frac{4}{3}\pi r^3 \Rightarrow V'(r) = \frac{4}{3}\pi(3r^2) = 4\pi r^2$$

$$12. R(x) = \frac{\sqrt{10}}{x^7} = \sqrt{10}x^{-7} \Rightarrow R'(x) = -7\sqrt{10}x^{-8} = -\frac{7\sqrt{10}}{x^8}$$

$$13. F(x) = (16x)^3 = 4096x^3 \Rightarrow F'(x) = 4096(3x^2) = 12,288x^2$$

$$14. y = \sqrt{x}(x-1) = x^{3/2} - x^{1/2} \Rightarrow y' = \frac{3}{2}x^{1/2} - \frac{1}{2}x^{-1/2} = \frac{1}{2}x^{-1/2}(3x-1) \quad (\text{factor out } \frac{1}{2}x^{-1/2})$$

or $y' = \frac{3x-1}{2\sqrt{x}}$.

$$15. y = 4\pi^2 \Rightarrow y' = 0 \text{ since } 4\pi^2 \text{ is a constant.}$$

$$16. H(s) = (s/2)^5 = s^5/2^5 = \frac{1}{32}s^5 \Rightarrow H'(s) = \frac{1}{32}(5s^4) = \frac{5}{32}s^4$$

$$17. y = \frac{x^2 + 4x + 3}{\sqrt{x}} = x^{3/2} + 4x^{1/2} + 3x^{-1/2} \Rightarrow$$

$$y' = \frac{3}{2}x^{1/2} + 4\left(\frac{1}{2}\right)x^{-1/2} + 3\left(-\frac{1}{2}\right)x^{-3/2} = \frac{3}{2}\sqrt{x} + \frac{2}{\sqrt{x}} - \frac{3}{2x\sqrt{x}}$$

$$18. y = \frac{x^2 - 2\sqrt{x}}{x} = x - 2x^{-1/2} \Rightarrow y' = 1 - 2\left(-\frac{1}{2}\right)x^{-3/2} = 1 + 1/(x\sqrt{x})$$

$$19. v = t^2 - \frac{1}{\sqrt[4]{t^3}} = t^2 - t^{-3/4} \Rightarrow v' = 2t - \left(-\frac{3}{4}\right)t^{-7/4} = 2t + \frac{3}{4t^{7/4}} = 2t + \frac{3}{4t\sqrt[4]{t^3}}$$

$$20. y = ae^v + \frac{b}{v} + \frac{c}{v^2} = ae^v + bv^{-1} + cv^{-2} \Rightarrow y' = ae^v - bv^{-2} - 2cv^{-3} = ae^v - \frac{b}{v^2} - \frac{2c}{v^3}$$

$$21. z = \frac{A}{y^{10}} + Be^y = Ay^{-10} + Be^y \Rightarrow z' = -10Ay^{-11} + Be^y = -\frac{10A}{y^{11}} + Be^y$$

$$22. u = \sqrt[3]{t^2} + 2\sqrt{t^3} = t^{2/3} + 2t^{3/2} \Rightarrow u' = \frac{2}{3}t^{-1/3} + 2\left(\frac{3}{2}\right)t^{1/2} = \frac{2}{3\sqrt[3]{t}} + 3\sqrt{t}$$