

1. Round 1:

(a) $y = \cos(\ln x)$

$$y' = -\sin(\ln x) \left(\frac{1}{x} \right)$$

(b) $f(x) = \frac{e^{3x} - 7}{5 - \sqrt{x}}$

$$f'(x) = \frac{(5 - \sqrt{x})(3e^{3x}) - (e^{3x} - 7) \left(-\frac{1}{2}x^{-1/2} \right)}{(5 - \sqrt{x})^2}$$

(c) $g(x) = \sqrt[3]{x} \sin(x^6 - 7x)$

$$g'(x) = \frac{1}{3}x^{-2/3} \sin(x^6 - 7x) + \sqrt[3]{x}(\cos(x^6 - 7x))(6x^5 - 7)$$

(d) $k(x) = 6 \tan(e^{-2x}) - 7^{13x}$

$$k'(x) = 6 \sec^2(e^{-2x})(-2e^{-2x}) - 7^{13x}(\ln 7)(13)$$

2. Round 2:

(a) $f(x) = x^{17} \tan(\sqrt{x})$

$$f'(x) = 17x^{16} \tan(\sqrt{x}) + x^{17} \sec^2(\sqrt{x}) \left(\frac{1}{2}x^{-1/2} \right)$$

(b) $y = 5^{e^x}$

$$y' = 5^{e^x}(\ln 5)(e^x)$$

(c) $g(x) = \frac{\cos e^x}{\sqrt{x^3 - 17}}$

$$g'(x) = \frac{\sqrt{x^3 - 17}(-\sin(e^x))(e^x) - (\cos e^x) \left(\frac{1}{2}(x^3 - 17)^{-1/2}(3x^2) \right)}{x^3 - 17}$$

(d) $h(x) = \ln((\sin x)^3 + 7)$

$$h'(x) = \frac{1}{(\sin x)^3 + 7} (3(\sin x)^2 \cos x)$$

3. Round 3:

(a) $f(x) = 5^e + e^{3x} \cos(2x)$

$$f'(x) = 3e^{3x} \cos(2x) + e^{3x}(-\sin(2x))(2)$$

(b) $g(x) = (\sqrt{x} + 7) \tan(5x)$

$$g'(x) = \left(\frac{1}{2}x^{-1/2}\right) \tan(5x) + (\sqrt{x} + 7)(\sec^2(5x))(5)$$

(c) $h(x) = \frac{1}{\sqrt{\ln x + 13}}$

$$h'(x) = \left(-\frac{1}{2}\right) (\ln x + 13)^{-3/2} \left(\frac{1}{x}\right) = \frac{-\frac{1}{2}(\ln x + 13)^{-1/2} \left(\frac{1}{x}\right)}{\ln x + 13}$$

(d) $y = x^{7/5}e^{11x}$

$$y' = (7/5)x^{2/5}e^{11x} + x^{7/5}(11e^{11x})$$

4. Round 4:

(a) $f(x) = \frac{\cos(2x) + 7}{e^{-5x} - 10}$

$$f'(x) = \frac{(e^{-5x} - 10)(-\sin(2x))(2) - (\cos(2x) + 7)(-5e^{-5x})}{(e^{-5x} - 10)^2}$$

(b) $y = 7(3^u) - 13u^2 - \pi$

$$y' = 7(3^u)(\ln 3) - 26u$$

(c) $g(t) = (t - 17)^{1/5}(t + 13)^{-7/3}$

$$g'(t) = (1/5)(t - 17)^{-4/5}(t + 13)^{-7/3} + (t - 17)^{1/5}(-7/3)(t + 13)^{-10/3}$$

(d) $h(x) = \ln(7x^2 + 75) \sin(2x^{-3})$

$$h'(x) = \frac{1}{7x^2 + 75}(14x) \sin(2x^{-3}) + \ln(7x^2 + 75) (\cos(2x^{-3})) (-6x^{-4})$$