

DAY 49

p. 159 #2, 6, 8, 10, 22-26, 30, 31, 37, 39

$$\begin{aligned} \textcircled{2} \quad f(x) &= \ln(1-x) \\ f'(x) &= \frac{1}{(1-x)} \cdot (-1) \\ f'(x) &= \frac{-1}{(1-x)} \end{aligned}$$

$$\begin{aligned} \textcircled{6} \quad f(x) &= \arctan(3x) \\ f'(x) &= \frac{1}{1+(3x)^2} \cdot 3 = \frac{3}{1+9x^2} \end{aligned}$$

$$\begin{aligned} \textcircled{8} \quad Q &= a \ln(bx+c) \\ Q'(x) &= \frac{a}{(bx+c)} \cdot b \\ Q'(x) &= \frac{ab}{(bx+c)} \end{aligned}$$

$$\begin{aligned} \textcircled{10} \quad f(x) &= e^{\ln(e^{2x^2+3})} = e^{2x^2+3} \\ &\text{Rewrite} \rightarrow \\ f'(x) &= (e^{2x^2+3})(4x) \end{aligned}$$

$$\begin{aligned} \textcircled{22} \quad f(y) &= \arcsin(y^2) \\ f'(y) &= \frac{1}{\sqrt{1-(y^2)^2}} \cdot (2y) \\ f'(y) &= \frac{2y}{\sqrt{1-y^4}} \end{aligned}$$

$$\begin{aligned} \textcircled{23} \quad s(x) &= \arctan(2-x) \\ s'(x) &= \frac{1}{1+(2-x)^2} \cdot (-1) \\ s'(x) &= \frac{-1}{1+(2-x)^2} \end{aligned}$$

$$\begin{aligned} \textcircled{24} \quad g(\alpha) &= \sin(\arcsin \alpha) \\ g(\alpha) &= \alpha \\ g'(\alpha) &= 1 \end{aligned}$$

$$\begin{aligned} \textcircled{25} \quad g(t) &= e^{\arctan(3t^2)} \\ g'(t) &= e^{\arctan(3t^2)} \cdot \frac{1}{1+9t^4} \cdot (6t) \end{aligned}$$

$$\begin{aligned} \textcircled{26} \quad g(t) &= \cos(\ln t) \\ g'(t) &= -\sin(\ln t) \left(\frac{1}{t}\right) \\ g''(t) &= \frac{-\sin(\ln t)}{t} \end{aligned}$$

$$g''(t) = \frac{(6t) \cdot e^{\arctan(3t^2)}}{1+9t^4}$$

$$\begin{aligned} \textcircled{30} \quad r(t) &= \arcsin(2t) \\ r'(t) &= \frac{1}{\sqrt{1-4t^2}} \cdot 2 \\ r'(t) &= \frac{2}{\sqrt{1-4t^2}} \end{aligned}$$

$$\begin{aligned} \textcircled{31} \quad j(x) &= \cos(\sin^{-1}(x)) \\ j'(x) &= -\sin(\sin^{-1}(x)) \cdot \left(\frac{1}{\sqrt{1-x^2}}\right) \\ j'(x) &= \frac{-x}{\sqrt{1-x^2}} \end{aligned}$$

DAY 49

$$(37) f(x) = \ln(\sin x + \cos x)$$

$$f'(x) = \left(\frac{1}{\sin x + \cos x} \right) \cdot (\cos x - \sin x)$$

$$f'(x) = \frac{\cos x - \sin x}{\sin x + \cos x}$$

$$*(39) T(u) = \arctan\left(\frac{u}{1+u}\right)$$

$$T'(u) = \frac{1}{1 + \left(\frac{u}{1+u}\right)^2} \cdot \left(\frac{1}{(1+u)^2}\right)$$

$$= \frac{1}{\left(1 + \frac{u^2}{(1+u)^2}\right) \cdot (1+u)^2}$$

$$= \frac{1}{(1+u)^2 + u^2}$$

$$= \boxed{\frac{1}{1+2u^2}}$$

inner function
derivative:

$$\frac{d}{du}\left(\frac{u}{1+u}\right)$$

$$= \frac{1(1+u) - u(1)}{(1+u)^2}$$

$$= \frac{1+u-u}{(1+u)^2}$$

$$= \frac{1}{(1+u)^2}$$

Simplify