MATH 3B WORKSHEET 1 ANSWER

DANNING LU

0.1. **Practice problem sets.**

0.1.1. *Set 1.*

(1) $y = (2x+5)^4$

$$y' = 8(2x+5)^3$$

(2) $y = \cos(4-3x)$

$$y' = 3\sin(4-3x)$$

(3) $y = \sin^2 x \cdot \sin(x^2)$

$$y' = 2\sin x \cos x \sin(x^2) + 2x \sin^2 x \cos(x^2)$$

(4) $y = \ln(1+x^2)$

$$y' = \frac{2x}{1+x^2}$$

(5) $y = e^{-3x^2}$

$$y' = -6xe^{-3x^2}$$

(6) $y = \tan(x^2)$

$$y' = 2x\sec^2(x^2) = \frac{2x}{\cos^2(x^2)}$$

0.1.2. *Set 2.*

(1) $y = \arcsin(1-2x)$

$$y' = \frac{-2}{\sqrt{1-(1-2x)^2}} = -\frac{1}{\sqrt{x-x^2}}$$

(2) $y = \dfrac{1}{\sqrt{1-x^2}}$

$$y' = \frac{x}{(1-x^2)^{3/2}}$$

(3) $y = e^{-\frac{x}{2}}\cos(3x)$

$$y' = -\frac{1}{2}e^{-x/2}(6\sin(3x) + \cos(3x))$$

(4) $y = \dfrac{1-\ln x}{1+\ln x}$

$$y' = -\frac{2}{x(1+\ln x)^2}$$

(5) $y = \ln(x + \sqrt{a^2 + x^2})$

$$y' = \frac{1 + \frac{x}{\sqrt{a^2+x^2}}}{x + \sqrt{a^2 + x^2}} = \frac{1}{\sqrt{a^2 + x^2}}$$

(6) $y = \dfrac{\sin(2x)}{x}$

$$y' = \frac{2x\cos(2x) - \sin(2x)}{x^2}$$

0.1.3. *Set 3.*

(1) $y = e^{\arctan\sqrt{x}}$

$$y' = \frac{e^{\arctan\sqrt{x}}}{\sqrt{x}(2x+2)}$$

(2) $y = \dfrac{\arcsin x}{\arccos x}$

$$y' = \frac{\arcsin x + \arccos x}{\sqrt{1-x^2}(\arccos x)^2}$$

(3) $y = \sqrt{x + \sqrt{x}}$

$$y' = \frac{\frac{1}{2\sqrt{x}} + 1}{2\sqrt{x + \sqrt{x}}}$$

(4) $y = \ln(\ln(\ln(x)))$

$$y' = \frac{1}{\ln(\ln x)} \cdot \frac{1}{\ln x} \cdot \frac{1}{x}$$

(5) $y = \sqrt{1 + \ln^2 x}$

$$y' = \frac{\ln x}{x\sqrt{1 + \ln^2 x}}$$

(6) $y = \arcsin\sqrt{\dfrac{1-x}{1+x}}$

$$y' = \frac{-\frac{1-x}{(1+x)^2} - \frac{1}{1+x}}{2\sqrt{\frac{1-x}{1+x}}\sqrt{1 - \frac{1-x}{1+x}}} = -\frac{1}{(1+x)\sqrt{2x - 2x^2}}$$