

1 Section 5

1.1 377/5-12, 17-27 odds (Section 5.6, day 1)

5. Find the arcsin of $\frac{1}{2}$ without using a calculator.

$$\arcsin \frac{1}{2} = \frac{\pi}{6}$$

6. $\arcsin 0 = 0$

7. $\arccos \frac{1}{2} = \frac{\pi}{3}$

8. $\arccos 0 = \frac{\pi}{2}$

9. $\arctan \frac{\sqrt{3}}{3} = \frac{\pi}{6}$

10. $\operatorname{arccot}(-\sqrt{3}) = -\frac{\pi}{6}$

11. $\operatorname{arccsc}(-\sqrt{2}) = \arcsin \frac{1}{(-\sqrt{2})} = -\frac{\pi}{4}$

12. $\arccos\left(-\frac{\sqrt{3}}{2}\right) = \frac{5\pi}{6}$

17. Evaluate without using a calculator:

(a)

$$\sin\left(\arctan \frac{3}{4}\right) = \frac{3}{5}$$

(b)

$$\sec\left(\arcsin \frac{4}{5}\right) = \frac{5}{3}$$

21. Write in “Algebraic” form.

$$\cos(\arcsin 2x) = 2x$$

23. Write in “Algebraic” form.

$$\sin(\operatorname{arcsec} x) = \frac{\sqrt{x^2 - 1}}{|x|}$$

25. Write in “Algebraic” form.

$$\tan\left(\operatorname{arcsec} \frac{x}{3}\right) = \frac{\sqrt{x^2 - 9}}{3}$$

27. Write in “Algebraic” form.

$$\csc\left(\arctan \frac{x}{\sqrt{2}}\right) = \frac{\sqrt{x^2 + 2}}{x}$$

1.2 378/41-65 e.o.o. (Section 5.6, day 2)

41. Find the derivative.

$$f(x) = 2 \arcsin(x - 1) \quad (1)$$

$$\frac{dy}{dx} = \frac{2}{\sqrt{1 - (x - 1)^2}} \quad (2)$$

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

$$= \frac{2}{\sqrt{2x - x}} \quad (4)$$

45. Find the derivative.

$$f(x) = \arctan \frac{x}{a} \quad (1)$$

$$\frac{dy}{dx} = \frac{\frac{1}{a}}{\left(\frac{x}{a}\right)^2 + 1} \quad (2)$$

$$= \frac{1}{a \left(\frac{x}{a}\right)^2 + a} \quad (3)$$

$$= \frac{1}{\frac{x^2}{a} + a} \quad (4)$$

$$= \frac{a}{x^2 + a^2} \quad (5)$$

49. Find the derivative.

$$f(x) = \sin(\arccos t) \quad (1)$$

$$\frac{dy}{dx} = [\cos(\arccos t)] \left[\frac{-1}{\sqrt{1 - t^2}} \right] \quad (2)$$

$$= \frac{-\cos(\arccos t)}{\sqrt{1 - t^2}} \quad (3)$$

$$= \frac{-t}{\sqrt{1 - t^2}} \quad (4)$$

53. Find the derivative.

$$y = \frac{1}{2} \left[\frac{1}{2} \ln \frac{x+1}{x-1} + \arctan x \right] \quad (1)$$

$$= \frac{1}{4} \ln \frac{x+1}{x-1} + \frac{1}{2} \arctan x \quad (2)$$

$$y = \frac{1}{4} \ln(x+1) - \frac{1}{4} \ln(x-1) + \frac{1}{2} \arctan x \quad (3)$$

$$\frac{dy}{dx} = 1 \left(\frac{1}{4x+4} \right) - 1 \left(\frac{1}{4x-4} \right) + \frac{1}{2x^2+2} \quad (4)$$

$$= \frac{1}{4x+4} - \frac{1}{4x-4} + \frac{1}{2x^2+2} \quad (5)$$

Notes: I had issue with these problems. Here's the solution as given in class:

53. Again.

$$y = \frac{1}{2} \left[\frac{1}{2} \ln \frac{x+1}{x-1} + \arctan x \right] \quad (1)$$

$$= \frac{1}{4} \ln(x+1) - \frac{1}{4} \ln(x-1) + \frac{1}{2} \arctan x \quad (2)$$

$$\frac{dy}{dx} = \frac{1}{4(x+1)} - \frac{1}{4(x-1)} + \frac{1}{2(x^2+1)} \quad (3)$$

$$= \frac{-x^2-1+x^2-1}{2(x^2+1)(x^2-1)} \quad (4)$$

$$= \frac{-1}{x^4-1} \quad (5)$$

57.

$$y = \frac{1}{2} \left[\frac{1}{2} \ln \frac{x+1}{x-1} + \arctan x \right] \quad (1)$$

$$\frac{dy}{dx} = \frac{2}{\sqrt{1-(\frac{x}{4})}} - \frac{1}{2} \left[\sqrt{16-x^2} + \frac{-2x^2}{2\sqrt{16-x^2}} \right] \quad (2)$$

$$= \frac{2}{\sqrt{\frac{16-x^2}{16}}} - \frac{1}{2} \left[\sqrt{16-x^2} + \frac{-2x^2}{2\sqrt{16-x^2}} \right] \quad (3)$$

$$= \frac{8}{\sqrt{16-x^2}} - \frac{\sqrt{16-x^2}}{2} + \frac{x^2}{2\sqrt{16-x^2}} \quad (4)$$

$$= \frac{16 - (16-x^2) + x^2}{2\sqrt{16-x^2}} \quad (5)$$

$$= \frac{x^2}{\sqrt{16-x^2}} \quad (6)$$

1.3 385/1-41 e.o.o. ; 47; 63

1. Find the Integral.

$$\int \frac{5}{\sqrt{9-x}} dx \quad (1)$$

5. Find the Integral.

$$\int \frac{1}{x\sqrt{4x^2-1}} dx \quad (1)$$

9. Find the Integral.

$$\int \frac{1}{\sqrt{1-(x+1)^2}} dx \quad (1)$$

13. Find the Integral.

$$\int \frac{e^{2x}}{4 + e^{4x}} dx \tag{1}$$