Assignment 1 (3/30)

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Problem 1

Determine the exact values of

(a) $\sec(\arcsec[-2/\sqrt{3}])$

(b) $\arctan(\tan[11\pi/4])$

(c) $\sin(2\arccos[1/2])$

(d) $\sec(\arctan[4/3])$

(e) $\arccos(\sec[7\pi]/6)$

Problem 2

Differentiate

(a) $\dfrac{\arctan(x)}{x}$

(b) $\arcsec(\cos x + 2)$

(c) $\arcsin\left(\frac{r}{r+1}\right)$

(d) $\frac{x}{\sqrt{c^2-x^2}} - \arcsin\left(\frac{x}{c}\right)$. Take $c > 0$.

Problem 3

Set

$$f(x) = \arctan\left(\frac{a+x}{1-ax}\right),\ x \neq 1/a$$

(a) Show that $f'(x) = \frac{1}{1+x^2}$.

(b) Show that there isno constant C such that

$$f(x) = \arctan(x) + C$$

for all $x \neq 1/a$.

(c) Find constants C_1 and C_2 such that

$$f(x) = \arctan(x) + C_1 \quad \text{for } x < 1/a$$
$$f(x) = \arctan(x) + C_2 \quad \text{for } x > 1/a$$

Problem 4

Find

$$\lim_{x \to 0} \frac{\arcsin(x)}{x}$$