

1. Find the exact value of each expression

(a)  $\tan^{-1}\sqrt{3}$

(b)  $\arcsin(-1/\sqrt{2})$

(c)  $\sec(\arctan 2)$

2. Find the derivative of the function.

(a)  $y = \sqrt{\tan^{-1} x}$

(b)  $y = \tan^{-1}\sqrt{x}$

(c)  $h(x) = (1 + x^2) \arctan x$

3. Find the limit.

(a)  $\lim_{x \rightarrow \infty} \arccos\left(\frac{1+x^2}{1+2x^2}\right)$

(b)  $\lim_{x \rightarrow \infty} \arctan(e^x)$

4. Find the limit. Use l'Hopital's Rule where appropriate.

(a)  $\lim_{x \rightarrow 1} \frac{x^a - 1}{x^b - 1}$

(b)  $\lim_{x \rightarrow 0} \frac{x + \tan x}{\sin x}$

(c)  $\lim_{x \rightarrow \pi/2} \frac{1 - \sin \theta}{\csc \theta}$

(d)  $\lim_{x \rightarrow \infty} (x - \ln x)$

5. If  $f'$  is continuous,  $f(2) = 0$ , and  $f'(2) = 7$ , evaluate  $\lim_{x \rightarrow 0} \frac{f(2+3x) + f(2+5x)}{x}$ .