Prove the logarithmic formula for $\sinh^{-1} x$. y=smh'x Smh y=x x = ey-e LET Z= P 15 2-5 $= 7^2 - 2x = -1$

SCORE: / 4 PTS Z= 2x±,4x Z= 2x=2,x2+ $(\frac{1}{2})_{Z} = X \pm \sqrt{X^{2} + 1} = e^{y}$ $\sqrt{\chi^2+1} > \chi \longrightarrow \chi - \sqrt{\chi^2+1} < O_{1}(\frac{1}{2})$ BUT ES>O 50 RY = X + 1X2+1 $y = \frac{1}{2} \ln (x + (x^2 + 1)) = smh'x$

Find $\frac{d}{dx}\sinh^{-1}(\operatorname{sech} x)$. T It sech x

sechx tanhx 1+ sech² x

GIVE YOURSELF FULL CREDIT IF YOU SKIPPED THIS LINE, BUT GOT CORRECT FINAL ANSWER

SCORE: ____/ 3 PTS

Find lim csch x. Do NOT use a graph. Give BRIEF algebraic or numerical reasoning. SCORE: 2 PTS $x \rightarrow 0$ IF x<0, ex < e-x $AS \times 0, e^{\times} - e^{\times} = 0, \frac{2}{e^{\times} - e^{\times}} \to \frac{2}{0} \to -\infty$

Estimate the area under the function shown on the right over the interval [-4, 4] using the left hand sum with 4 equal width subintervals.

$$\Delta x = \frac{4 - 4}{4} = 2$$
LEFT ENDPOINTS $X = -4, -2, 0, 2$

$$f(-4) \Delta x + f(-2) \Delta x + f(0) \Delta x + f(2) \Delta x$$

$$= (2)(2) + (3)(2) + (2)(2) + (1)(2)$$

$$= (2 + 3 + 2 + 1)(2)$$

$$= 16$$

$$f(-4) \Delta x + f(-2) \Delta x + f(0) \Delta x + f(2) \Delta x$$

SCORE:

/ 3 PTS

Prove the derivative of $\operatorname{coth}^{-1} x$. Do NOT use any other inverse hyperbolic functions in your proof. SCORE: _____/ 5 PTS You may use any of the other identities or derivatives of (non-inverse) hyperbolic functions that were listed in your textbook without proving them. NOTE: The Pythagorean-like identity for coth x must be proven if you wish to use it.



 $\cosh^2 y - \sinh^2 y = 1$ 1) smhzy - smhzy = 1 Smhzy - smhzy = smhzy Dethy - 1= csch2y $x^2 - 1 = \operatorname{csch}^2 y$

Using the definition of "area under a function" given in class, write an algebraic expression for the area under SCORE: / 3 PTS $f(x) = \sqrt{2x+1}$ over the interval [3, 7]. Do NOT evaluate the expression. You do NOT need to draw a graph to explain your answer. lim Z. f(3+i Dx) Dx $\Delta x = \frac{7-3}{12} = 4$ = lim 2; f(3+4i) 4; $(1) = \lim_{n \to \infty} \sum_{i=1}^{n} \frac{1}{n} \sqrt{7 + \frac{8i}{n}}$ SUBTRACT (E) POINT IF YOU TRIED TO SIMPLIFY BUT DID NOT GET THIS