SCORE: 4 / 20 POINTS + _____ / 10 POINTS FROM GREENSHEET QUIZ

NO CALCULATORS ALLOWED
SHOW PROPER WORK & SIMPLIFY ALL ANSWERS
(ANSWERS WITHOUT SOLUTIONS WILL *NOT* EARN FULL CREDIT)

Using the definition of "area under a function" given in class, write an algebraic expression for the area under $f(x)=\sqrt{2x+3}$ over the interval $[1, 7]$. **Do NOT evaluate the expression. You do NOT need to draw a graph to explain your answer.** SCORE: 0 / 3 PTS

$$\lim_{x \to \infty} \sum_{n=1}^{7} f(\sqrt{2x+3})\Delta x$$

$\Delta x = 6$

Find $\frac{d}{dx}\sinh^{-1}(\operatorname{sech} x)$. SCORE: 0 / 3 PTS

$$\frac{d}{dx}(\sinh^{-1}x) = \frac{1}{\sqrt{x^2-1}} = \frac{1}{\sqrt{\operatorname{sech}^2 x - 1}}$$

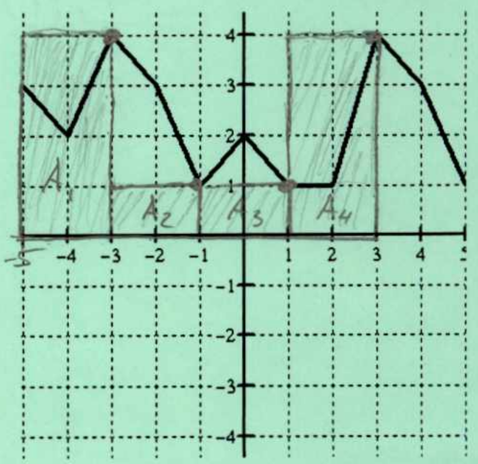
Estimate the area under the function shown on the right over the interval $[-5, 3]$ using the right hand sum with 4 equal width subintervals. SCORE: 3 / 3 PTS

$A = a_1 + a_2 + a_3 + a_4$

$= (4\cdot 2) + (1\cdot 2) + (1\cdot 2) + (4\cdot 2)$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$

$8 + 2 + 2 + 8$

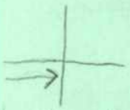
$= 20$ $\frac{1}{2}$



$\sinh x = \frac{e^x - e^{-x}}{2}$

Find $\lim_{x \to 0^-} \operatorname{csch} x$. **Do NOT use a graph. Give *BRIEF* algebraic or numerical reasoning.** SCORE: 0 / 2 PTS

- $\lim_{x \to 0^-} \operatorname{csch} x$
- $\lim_{x \to 0^-} \frac{2}{e^x - e^{-x}} = \frac{2}{e^{1} - e^{1}} \overset{\to 2}{\underset{\to 0}{\approx}}$ D.N.E.



Prove the logarithmic formula for $\sinh^{-1} x$. SCORE: 0 / 4 PTS

$\sinh^{-1} x = \ln\left(\sqrt{x^2+1}\right)$

$\cancel{= \ln(x)}$

$\cancel{e^{0} = e^{\ln(x)}}$

Prove the derivative of $\coth^{-1} x$. **Do NOT use any other inverse hyperbolic functions in your proof**. SCORE: 1 / 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.**

$\frac{d}{dx}(\coth^{-1})x = \frac{1}{1-x^2}$ 1

$\frac{d}{dx}\frac{1}{\tanh^{-1} x} = \frac{f'(x)g(x) - f(x)g'(x)}{g(x)^2} = \frac{\tanh^{-1} x - \frac{1}{1-x^2}}{\left(\tanh^{-1} x\right)^2}$