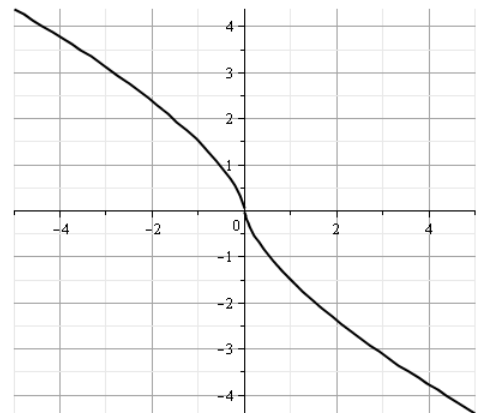


1. (10 pts) Let $f(x) = \frac{2x+1}{4x-3}$. Find $f^{-1}(x)$, and state the domain and range of f and f^{-1} .

2. The graph of f is given.

a. (5 pts) Estimate the value of $f^{-1}(-3)$.

b. (5 pts) Sketch the graph of f^{-1} .



3. Find the exact value of each of the following:

a. (5 pts) $e^{\frac{1}{2}\ln(2)}$

b. (5 pts) $\tan\left(\cos^{-1}\left(\frac{\sqrt{2}}{2}\right)\right)$

4. (10 pts) Solve $e^x + 6e^{-x} = 5$ for x . Do not bother with a decimal approximation.

5. Differentiate. Do not simplify.

a. (5 pts) $f(x) = \sqrt{1 + xe^{-3x}}$

b. (5 pts) $g(x) = (\cos(5x))^{x^2 - 2x}$

c. (5 pts) $y = \ln\left(\frac{(x^2 + 1)^5(x + 3)}{(2x + 1)^4}\right)$

6. (5 pts) Find the domain of $\ln(x^2 + 5x - 14)$.

7. A population of bacteria triples in population every 10 hours.

a. (5 pts) Find the relative growth rate of the bacteria population.

b. (5 pts) If the initial population was 100 cells, what is the bacteria population after 2 days?

8. (5 pts) If $\sinh x = \frac{3}{7}$, find the value of the other 5 hyperbolic trigonometric functions.

This should not require a calculator.

9. (10 pts) Evaluate $\lim_{x \rightarrow 0} (\csc(x) - \cot(x))$.

10. Evaluate the integral.

a. (5 pts) $\int_0^1 3 \cdot 5^{-x^2} x dx$

b. (5 pts) $\int \frac{\operatorname{sech}^2(x)}{\tanh(x) - 7} dx$

c. (5 pts) $\int \frac{1}{x\sqrt{x^2 - 4}} dx$

(Hint: We talked about one like this in class on Wednesday. Ken made a nice suggestion for u that allowed us to factor a 4 out of the radical, and then it fit one of our cheat sheet formulas.)