MATH 104 TUTORIAL 5

1. find $f^{-1}(x)$ and identify the domain and range of f^{-1}

a. $f(x) = (1/2)x - 7/2$

b. $f(x) = 1/x^3, \quad x \neq 0$

2. Let $f(x) = x^3 - 3x^2 - 1, x \geq 2$. Find the value of df^{-1}/dx at the point $x = -1 = f(3)$.

3. Find the derivative of y with respect to x, as appropriate.

a. $y = \dfrac{\ln x}{1 + \ln x}$ **b.** $y = \dfrac{1}{2}\ln\dfrac{1+x}{1-x}$

4. Evaluate the integrals

a. $\displaystyle\int_0^{\pi/3} \frac{4\sin\theta}{1 - 4\cos\theta}\, d\theta$ **b.** $\displaystyle\int_2^4 \frac{dx}{x(\ln x)^2}$

5. Find the derivative of y with respect to x, t *or* θ.

a. $y = e^{(4\sqrt{x}+x^2)}$ **b.** $y = xe^x - e^x$

c. $y = e^{\theta}(\sin\theta + \cos\theta)$ **d.** $y = \cos(e^{-\theta^2})$ **e.** $y = e^{(\cos t + \ln t)}$

6. Evaluate the integrals

a. $\displaystyle\int_{\ln 2}^{\ln 3} e^x\, dx$ **b.** $\displaystyle\int 2e^{(2x-1)}\, dx$ **c.** $\displaystyle\int \frac{e^{1/x}}{x^2}\, dx$

7. Use logarithmic differentiation to find the derivative of y with respect to x.

a. $y = (x + 1)^x$ **b.** $y = (\ln x)^{\ln x}$