

Do all your work and put all your answers WITH your work, CIRCLED, on the white paper provided. All I want on this sheet is your NAME! Spend no more than 2 minutes on any single problem on your first pass through the test. If you don't finish a problem in 2 or 3 minutes, start a fresh sheet of paper for the next problem, and so on.

Formatting should be the same as homework, only you don't need to re-state the question, because the question's attached to your test!

1. The function $f(x) = x^2 + 5x + 11$ is 1-to-1 on the restricted domain $D = \left[-\frac{5}{2}, \infty\right)$.

a. (10 pts) Find the inverse function $f^{-1}(x)$. State its domain and range.

b. (5 pts) Find $(f^{-1})'(5)$, directly, by differentiating your answer for part a.

c. (5 pts) Find $(f^{-1})'(5)$ by applying a theorem regarding derivatives of inverse functions.

2. (5 pts each) Find the derivative with respect to x . All "-1" powers refer to function inverses, not reciprocals.

a. $y = 7 \cdot 5^{x^2-3x}$

d. $y = [\cos(x)]^{x^2-3x}$

b. $y = \ln\left(\frac{\sqrt[5]{x^2-3x}}{(3x^5+5x)^3}\right)$

e. $y = \sin(x) \cdot \cos^{-1}(5x^3-7x)$

c. $y = \log_5(x^2-3x)$

f. $y = \sin(x) \cdot \cosh^{-1}(5x^3-7x)$

3. (5 pts each) Evaluate the integrals

a. $\int \sin(x) \cdot e^{\cos(x)} dx$

b. $\int \frac{dx}{\sqrt{x^2+25}}$

4. (5 pts each) Simplify the following.

a. $\sec\left(\cot^{-1}\left(\sqrt{9-x^2}\right)\right)$

b. $\cot^{-1}\left(\cot\left(\frac{7\pi}{6}\right)\right)$. I think you're OK on the domains, after class talk.

5. (10 pts) The half-life of Millsium is 75 years. How old is a Mills skeleton from a burial mound if there is 17% of its natural radioactive Millsium remaining?

6. (5 pts each) Evaluate the following limits:

a. $\lim_{x \rightarrow \infty} (x^{1/x})$

b. $\lim_{x \rightarrow 5} \frac{x^2-7x+10}{x^2-2x-15}$

c. $\lim_{x \rightarrow 0} \frac{e^x-1-x}{x^2}$