

Show no work. *NOTE:* The **inverse-fnc** of g , often written as g^{-1} , is *different* from the **reciprocal fnc** $1/g$. E.g, suppose g is invertible with $g(-2) = 3$ and $g(3) = 8$: Then $g^{-1}(3) = -2$, yet $[1/g](3) \stackrel{\text{def}}{=} 1/g(3) = 1/8$.

Write **DNE** in a blank if the described object does not exist or if the indicated operation cannot be performed.

U1:

a On \mathbb{Z}_+ , write $x \$ y$ IFF $xy < 0$. So $\$$ is Circle

Transitive: T F . **Symm.:** T F . **Reflex.:** T F .

On \mathbb{Z} , say that $x \nabla y$ IFF $x - y \leq 1$. Then ∇ is:

Trans.: T F . **Symm.:** T F . **Reflex.:** T F .

(Be careful on both parts!)

b Let \mathcal{P}_∞ denote the family of all *infinite* subsets of \mathbb{N} . Define relation \approx on \mathcal{P}_∞ by: $A \approx B$ IFF $A \cap B$ is infinite. Stmt " $This \approx$ is an equivalence-relation" is: T F

c $[\sqrt{2}^{\sqrt{27}}]^{\sqrt{3}} =$ _____ . $\log_8(4) =$ _____

d Quadratic $15x^2 + 23x + 6 = [Ax - \alpha] \cdot [Bx - \beta]$, for numbers $A =$ _____ , $\alpha =$ _____ ; $B =$ _____ , $\beta =$ _____

e Below, f and g are differentiable fncs with

$$\begin{aligned} f(2) &= 3, & f(3) &= 5, & f'(2) &= 19, & f'(3) &= 17, \\ g(2) &= 11, & g(3) &= 13, & g'(2) &= \frac{1}{2}, & g'(3) &= 7, \\ f(5) &= 43, & g(5) &= 23, & f'(5) &= 41, & g'(5) &= 29. \end{aligned}$$

Define the composition $C := g \circ f$. Then

$$C(2) = \text{_____}; \quad C'(2) = \text{_____}$$

Please write each answer as a product of numbers; **do not** multiply out. [*Hint:* The Chain rule.]

f Let $y = f(x) := [7 + \sqrt[3]{2x}]/5$. Its inverse-function is $f^{-1}(y) =$ _____

g Compute the sum of this geometric series:
 $\sum_{k=1}^{\infty} [-1]^k \cdot [1/3]^{2k} =$ _____

End of Prereq-U

Please PRINT your Name

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Please PRINT your Student-ID number (just this once)

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HONOR CODE: "*I have neither requested nor received help on this exam other than from my professor.*"

Signature: _____