

Hello. This practice exam is longer than what the actual prereq-knowledge exam will be.

V2: 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** if the object does not exist or the operation cannot be performed. NB: **DNE** $\neq \{ \} \neq 0 \neq$ *Empty-word*.

ℓ1 The **slope** of line $3[y - 5] = 2[x - 2]$ is _____
Point $(-4, y)$ lies on this line, where $y =$ _____

ℓ2 Line $y = [M \cdot x] + B$ owns points $(4, 3)$ and $(-2, 5)$.
Hence $M =$ _____ and $B =$ _____

ℓ3 Line $y = Mx + B$ is orthogonal to $y = \frac{1}{3}x + 2$ and owns $(2, 1)$. So $M =$ _____ and $B =$ _____

q1 The solutions to $3x^2 = 2 - 2x$
are $x =$ _____

q2 The four solutions to $[y - 2] \cdot y \cdot [y + 2] = -1/y$
are $y =$ _____

[Hint: Apply the Quadratic Formula to y^2 .]

e1 $[\sqrt{3}^{\sqrt{2}}]^{\sqrt{8}} =$ _____ . $\log_{64}(16) =$ _____

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

id1 Suppose g is a fnc with g' never zero. Let h be the inverse-fnc of g . In terms of h, g, g' and x , write a formula for $h'(x) =$ _____

[Hint: The Chain rule. NOTE: h is **NOT** $1/g$.]

id2 Let $g(x) := x^3 + x$. Then $g^{-1}(10) =$ _____
and $[g^{-1}]'(10) =$ _____

de1 For $x > 0$, let $B(x) := x^x$. Its derivative is $B'(x) =$ _____

[Hint: How is y^z , for $y > 0$, defined in terms of the exponential fnc?]

a For $x > 0$, let $B(x) := x^{\sin(x)}$. Hence its derivative is $B'(x) = B(x) \cdot M(x)$, where $M(x)$ equals _____

[Hint: How is y^z , for $y > 0$, defined in terms of the exponential fnc?]

de2 On those x where $\sin(x) > 0$, define $B(x) := [\sin(x)]^x$. Its derivative is $B'(x) =$ _____

[Hint: How is y^z , for $y > 0$, defined in terms of the exponential fnc?]

dc1 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.]

sg1 Compute the sum of this geometric series:

$$\sum_{n=3}^{\infty} [-1]^n \cdot [3/5]^n = \text{_____}$$

sg2 For natural number K , the sum

$$\sum_{n=3}^{3+K} 4^n \text{ equals } \text{_____}$$

sg3 $\sum_{n=1}^{\infty} r^n = \frac{5}{8}$. So $r =$ _____ or **DNE**.

[Hint: The sum starts with n at **one**, not zero.]

di1 With $f(t) := \int_{t^5}^{7t} \cos(\sin(x)) \, dx$, then $f'(t)$ equals _____

Simplified, $f'(0) =$ _____

[Hint: Chain rule and Fund. Thm of Calculus.]

sc The series $\sum_{k=1}^{\infty} \frac{[-1]^k}{\log(k)}$ (circle one): _____ Diverges,

Converges absolutely, _____ Converges conditionally.

pf Partial-fraction decomposition:

$$\frac{x + 1}{x^2 + x - 2} = \text{_____} + \text{_____}$$