

Name:

MATH IB

1. (38%) Given that: $f(x) = \ln(x-1) + x$, $g(x) = e^{-2x} + 1$, $s(x) = \frac{x+1}{3-2x}$, find:

a. (4%) Find, simplified.

$$f(g(x)) =$$

d. (4%) $g \circ f(e+1)$

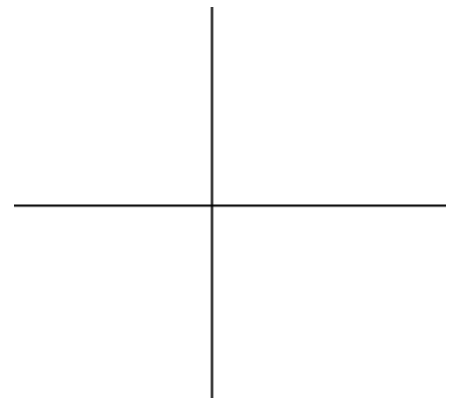
b. (4%) $s(g(0)) =$

e. (4%) $s^{-1}(s(x)) =$

c. (4%) $s^{-1}(-2) =$

f. (4%) $g(\underline{\quad}) = e + 1$

g. (10%) Sketch $g(x)$ and $g^{-1}(x)$ on the same graph, write down the coordinates of all intercepts and asymptotes. Illustrate the asymptotes on the graph.



h. (4%) $f(x)$ is _____ of $f^{-1}(x)$

2. (10%) Given that $f(x) = 5 - 2^{3-2x}$, find the inverse function $f^{-1}(x)$.

3. (15%) Consider the functions $f: x \mapsto 10(x - 1)$ and $g: x \mapsto \frac{x+1}{3-2x}$.

(a) (8%) Find g^{-1} .

(b) (7%) Solve the equation $(f \circ g^{-1})(x) = 4$.

4. (10%) Given the function: $H(x) = \sin(10x)$ and

a. (4%) $H\left(\frac{\pi}{6}\right) =$

b. (6%) $H(x)$ can be written in the form $2\sin(kx)\cos(kx)$, find k .

5. (14%) The function f is given by $f(x) = 2x^2 + 12x + 23$, for $x \geq -3$.

(a) (5%) Write $f(x)$ in the form $k(x + a)^2 + b$.

(b) (5%) Find the inverse function f^{-1} .

(c) (4%) State the domain of f^{-1} .

6. (13%) Consider the function f , where $f(x) = (\ln(\sin(x)))$ and $0 \leq x < \pi$

(a) (7%) Find the exact domain of f .

(b) (6%) Find $f^{-1}(x)$.