

Answer the following questions. Keep in mind that you will have to show your work on the exam to earn credit. This practice exam is not comprehensive. It is only meant for practice, and to supplement your exam preparation.

1. Consider the following functions:

$$f(x) = \sqrt{x^2 - 9}$$

$$j(x) = \ln(1 - x)$$

$$g(x) = \frac{1}{x^2 - 16}$$

$$k(x) = e^x$$

$$h(x) = \frac{1}{x}$$

$$m(x) = \cos(x)$$

For each of the following, find the domain of the function:

(a) $f(x)$

(b) $g(x)$

(c) $(h \circ h)(x)$

(d) $j(x)$

(e) $(g \circ f)(x)$

(f) $(h \circ f)(x)$

(g) $(h \circ j)(x)$

(h) $(j \circ k)(x)$

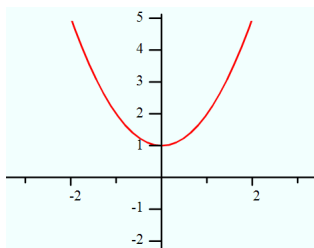
(i) $(j \circ m)(x)$

(j) $(g \circ m)(x)$

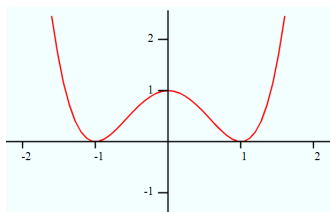
(k) $(h \circ m)(x)$

(l) $(f \circ m)(x)$

2. (a) The graph of $f(x)$ is given. Sketch $2f(x + 1)$. Label all x and y intercepts.



- (b) The graph of $g(x)$ is given. Sketch $-g\left(\frac{x}{2}\right)$. Label all x and y intercepts.



3. (a) Find the equation of the curve obtained by reflecting the graph of $f(x) = x^3$ about the line $y = 2$.
- (b) Find the equation of the curve obtained by reflecting the graph of $f(x) = x^2$ about the line $x = -3$.
- (c) Find the equation of the curve obtained by reflecting the graph of $f(x) = e^{-x}$ about the line $y = -1$.
- (d) Find the equation of the curve obtained by reflecting the graph of $f(x) = \ln(x)$ about the line $y = x$.
4. (a) Suppose that the graph of $f(x)$ is a parabola intersecting the origin and containing the points $(-2, 8)$ and $(-3, 6)$. Find $f(x)$.
- (b) Suppose that $g(x)$ is a quadratic whose graph contains the points $(-1, 1)$, $(0, 1)$ and $(2, 1)$. Find $g(x)$.

(c) Suppose that $h(x) = Ab^x$ has a graph which contains the points $(0, 3)$ and $(3, 24)$. Find $h(x)$.

5. Find the inverse functions of the following functions.

(a) $f(x) = \ln(1 + x) - 2$

(b) $f(x) = \frac{2x+1}{x-1}$

(c) $f(x) = \cos(x^3 + 1)$

(d) $f(x) = e^{x^5-1}$

(e) $f(x) = \sqrt{3 + 2x}$

(f) $f(x) = \tan^{-1}(e^x)$

6. Express the following as a single logarithm.

(a) $\log_4(x) + 2\log_4(y) - 2\log_2(8) + 3$

(b) $2\ln(ab) - \frac{1}{2}\ln(c) + \ln(b^2)$

7. Find the exact value of each expression.

(a) $\ln(1/e^2)$

(b) $e^{-3\ln(2)}$

(c) $\cos^{-1}(\cos(3\pi))$

(d) $\tan^{-1}(\sin(\pi/2))$

8. Solve the following equations.

(a) $3\ln(2x) = 1$

(b) $\log_3(x) + \log_3(x - 2) = 1$

(c) $e^{2x+1} = 2$

(d) $e^{x^2} = 3$

9. Simplify the following expressions.

(a) $\tan(\sin^{-1}(2x))$

(b) $\cos(\tan^{-1}(x))$

(c) $\sin(\sec^{-1}(x^2))$

10. Evaluate the following limits.

(a) $\lim_{x \rightarrow 4} \frac{x^2 - 4x}{x^2 - 3x - 4}$

(b) $\lim_{x \rightarrow -1} \frac{x^2 - 4x}{x^2 - 3x - 4}$

(c) $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$

(d) $\lim_{x \rightarrow 16} \frac{16 - x}{4 - \sqrt{x}}$

(e) $\lim_{x \rightarrow 0} \frac{(2+x)^3 - 8}{x}$

(f) $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{x^2 + x} \right)$