

Homework 1

The **due date** for this homework is **Tue 7 May 2013 12:00 AM EDT**.

Question 1

Which of the following intervals are contained in the domain of the function

$$\sqrt{2x - x^3} ?$$

- ☐ $[-\sqrt{2}, 0]$
- ☐ $[\sqrt{2}, +\infty)$
- ☐ $(-\infty, -\sqrt{2}]$
- ☐ $[0, \sqrt{2}]$

Question 2

Which of the following intervals are contained in the domain of the function

$$\frac{x - 3}{x^2 - 4} \ln x ?$$

- ☐ $(0, 2)$
- ☐ $(-\infty, -2)$
- ☐ $(2, +\infty)$
- ☐ $(-2, 0)$

Question 3

What is the domain of the function $\ln \sin x$?

- ☐ The union of all intervals of the form $(n\pi, (n + 1)\pi)$ for n an even integer.

- ☐ The union of all intervals of the form $[n\pi, (n+1)\pi]$ for n an even integer.
- ☐ The union of all intervals of the form $(n\pi, (n+1)\pi)$ for n an odd integer.
- ☐ The union of all intervals of the form $[n\pi, (n+1)\pi]$ for n an odd integer.

Question 4

What is the domain of the function $\arcsin \frac{x-2}{3}$?

- ☐ $[-2, 2]$
- ☐ $\mathbb{R} = (-\infty, +\infty)$
- ☐ $[-2, 3]$
- ☐ $[-1, 5]$
- ☐ $\left[\frac{2}{3}, \frac{5}{3}\right]$
- ☐ $[2-3\pi, 2+3\pi]$

Question 5

What is the range of the function $-x^2 + 1$?

- ☐ $(-\infty, 1]$.
- ☐ $[0, 1]$.
- ☐ $[1, +\infty)$.
- ☐ $(-\infty, 0]$
- ☐ $\mathbb{R} = (-\infty, +\infty)$
- ☐ $[0, +\infty)$

Question 6

What is the range of the function $\ln(1 + x^2)$?

- ☐ $(-\infty, 0]$
- ☐ $(-\infty, 1]$
- ☐ $\mathbb{R} = (-\infty, +\infty)$
- ☐ $[-1, +\infty)$
- ☐ $[1, +\infty)$
- ☐ $[0, +\infty)$

Question 7

What is the range of the function $\arctan \cos x$?

- ☐ $[0, +\infty)$
- ☐ $\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$
- ☐ $(-\infty, 0]$
- ☐ $\mathbb{R} = (-\infty, +\infty)$
- ☐ $[-\pi, \pi]$
- ☐ $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

Question 8

If $f(x) = 4x^3 + 1$ and $g(x) = \sqrt{x+3}$, compute $(f \circ g)(x)$ and $(g \circ f)(x)$.

- ☐ $(f \circ g)(x) = (g \circ f)(x) = (4x^3 + 1)\sqrt{x+3}$
- ☐ $(f \circ g)(x) = 4(x+3)^{3/2} + 1$ and $(g \circ f)(x) = 2\sqrt{x^3 + 1}$
- ☐ $(f \circ g)(x) = (g \circ f)(x) = 4x^3 + 1 + \sqrt{x+3}$
- ☐ $(f \circ g)(x) = 2\sqrt{x^3 + 1}$ and $(g \circ f)(x) = 4(x+3)^{3/2} + 1$

Question 9

Let $f(x) = (x + 2)^{-1}$. Determine $f \circ f$.

- ☐ $(f \circ f)(x) = \frac{2x + 5}{x + 2}$
- ☐ $(f \circ f)(x) = 1$
- ☐ $(f \circ f)(x) = x + 2$
- ☐ $(f \circ f)(x) = \frac{1}{(x + 2)^2}$
- ☐ $(f \circ f)(x) = \frac{x + 2}{2x + 5}$
- ☐ $(f \circ f)(x) = \frac{2}{x + 2}$

Question 10

What is the inverse of the function $f(x) = e^{2x}$?

- ☐ $f^{-1}(x) = \ln \sqrt{x}$
- ☐ The exponential functions is its own inverse, so $f^{-1}(x) = e^{2x}$
- ☐ $f^{-1}(x) = \ln x^2$
- ☐ $f^{-1}(x) = \frac{1}{e^{2x}}$
- ☐ $f^{-1}(x) = \frac{1}{2} \ln x$.
- ☐ $f^{-1}(x) = \log_2 x$.

Question 11

What is the inverse of the function $f(x) = \sin x^2$?

- ☐ $f^{-1}(x) = \sqrt{\csc x}$
- ☐ $f^{-1}(x) = \frac{1}{2} \arcsin x$
- ☐ $f^{-1}(x) = \arcsin \frac{x}{2}$
- ☐ $f^{-1}(x) = \sqrt{\arcsin x}$
- ☐ $f^{-1}(x) = \arcsin \sqrt{x}$
- ☐ $f^{-1}(x) = \frac{1}{\sin x^2}$

Question 12

What is the inverse of the function $f(x) = \arctan(\ln 3x)$?

- ☐ $f^{-1}(x) = \tan e^{x/3}$
- ☐ $f^{-1}(x) = e^{(\tan x)/3}$
- ☐ $f^{-1}(x) = \frac{1}{3} \tan e^x$
- ☐ $f^{-1}(x) = \tan\left(\frac{1}{3} e^x\right)$
- ☐ $f^{-1}(x) = \frac{1}{3} e^{\tan x}$
- ☐ $f^{-1}(x) = \frac{1}{\arctan(\ln 3x)}$

☐ In accordance with the Honor Code, I certify that my answers here are my own work.

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