

Name: _____ IU Username: _____

Exam 1

In-class

- You will have **50 minutes** to complete this exam.
- This exam is printed double sided.
- This exam will be scanned. Please use only regular pencil or black ink.
- Do **NOT** detach this cover sheet from the exam.
- There is a blank page at the end of the test; it may be detached and used as scratch paper.
- During this exam, you may only use the scratch paper and writing utensils. **No calculators**, cell phones, books, notes or other resources will be permitted.
- **Multiple Choice:** No justification necessary. No partial credit. Fill in the bubble for your answer.
- **Short Answer:** No justification necessary. No partial credit. Write your answer in the box.
- **Free Response:** You must **justify your solution** to receive full credit on a problem. Any of your classmates should be able to understand how you arrived at your solution. Partial credit will be granted for work that demonstrates understanding of key concepts.
- **You can do it!**

POINT DISTRIBUTION

Short Answer: 3 problems \times 10 points each = 30 points
Multiple Choice: 3 problems \times 10 points each = 30 points
Free Response: 3 problems; 10+10+20 = 40 points
Total: 100 points

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SHORT ANSWER

You do **NOT** need to justify your solutions in this section. Simply write your answer in the box. Each problem is worth ten (10) points.

Problem 1. Determine if the following function is even, odd, or neither:

$$f(x) = |x| - x^2 + 4$$

Recall that $|x|$ is the absolute value of x .

Problem 2. Find the intervals on which the function F given below is continuous.

$$F(x) = \frac{\ln x}{x^2 - 4x + 3}$$

Problem 3. Determine whether $f(x) = 3 - 2x$ is increasing or decreasing on $(-\infty, \infty)$.

MULTIPLE CHOICE

You do **NOT** need to justify your solutions in this section. Simply fill in the circle that corresponds to your answer. Each problem is worth ten (10) points.

Problem 4. Let $g(x)$ and $f(x)$ be two continuous functions on an interval I . Which of the following functions is NOT always continuous on I ?

(A) $f(x) + g(x)$

(B) $2g(x)$

(C) $f^2(x) + g(x)f(x)$

(D) $\frac{f(x)}{g(x)}$

(E) $5g(x) - f(x) + 1$

Problem 5. Find $\lim_{x \rightarrow 0} \frac{\sqrt{4+x} - \sqrt{4-x}}{x^2 + x}$.

(A) ∞ (B) 0 (C) 1

(D) $\frac{1}{2}$ (E) $-\infty$ (F) Does not exist and not $\pm\infty$

Problem 6. Which of the following statements is FALSE for a one-to-one function $f(x)$ on an interval $[0, 5]$?

- Ⓐ f^{-1} exists
- Ⓑ $f(1) \neq f(4)$
- Ⓒ $f(x_1) = f(x_2)$ for all x_1, x_2 in $[0, 5]$
- Ⓓ $f(x_1) \neq f(x_2)$ whenever $x_1 \neq x_2$ in $[0, 5]$
- Ⓔ If $f(2) = 10$, then $f^{-1}(10) = 2$.

FREE RESPONSE

For each of the questions in this section, you must **provide justification** for your answers.

Problem 7. (10 points) Show that the equation $\log_5 x = 3 - x$ has at least one real solution.

!!!A useful reminder: for all positive numbers a , we have $\log_a a = 1$ and $\log_a 1 = 0$.

Problem 8. (10 points) Find the horizontal and vertical asymptotes of f where

$$f(x) = \frac{7x + 8}{3 - x}.$$

Problem 9. (20 points) No explanation is required for either part.
Draw a graph of a function that satisfies **all** of the following conditions.

(i) $\lim_{x \rightarrow -\infty} f(x) = -3$

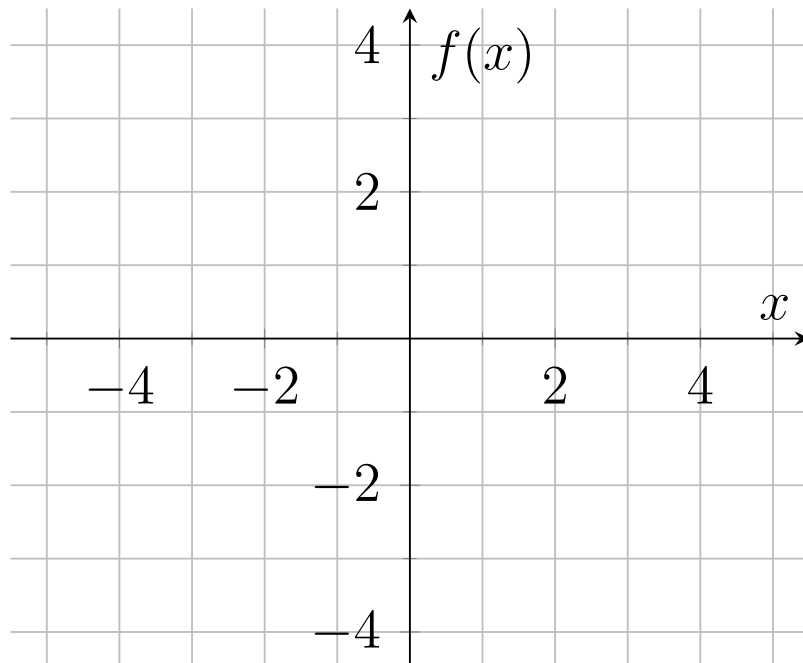
(iv) $\lim_{x \rightarrow 1^+} f(x) = 1$

(ii) $\lim_{x \rightarrow -2} f(x) = \infty$

(v) $f(1) = 2$

(iii) $\lim_{x \rightarrow 1^-} f(x) = -2$

(vi) $\lim_{x \rightarrow \infty} f(x) = 3$



Scratch Page

Scratch Page

