CS 173, Spring 19 Examlet 1, white

Name: _____

NetID: _____ **Lecture:** A B

Discussion: Thursday Friday 9 10 11 12 1 2 3 4 5 6

1. (5 points) Multiply out and simplify, showing your work.
   $(x^{x-2} + x^2)^2 =$

2. (10 points) Check the (single) box that best characterizes each item.

   Shorthand for the set of integers. $\mathbb{J}$ ☐ $\mathbb{N}$ ☐ $\mathbb{W}$ ☐ $\mathbb{Z}$ ☐

   If $\sqrt{2}$ is rational, then -3 is positive. true ☐ false ☐ undefined ☐

   $\log_2 3 < \log_3 2$ true ☐ false ☐

   $(p \vee \neg p) \rightarrow q$ true ☐ false ☐ depends on q ☐

   $\neg(p \wedge \neg q) \equiv \neg p \vee q$ true ☐ false ☐

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1. (5 points) Simplify, showing your work.
   $\frac{\log_2(32^3)}{5} =$

2. (10 points) Check the (single) box that best characterizes each item.

   $\sqrt{2} \in \mathbb{Q}$ true ☐ false ☐

   For all positive integers n,
   if $n! < 10$, then $n < 100$. true ☐ false ☐

   $a^{b^c} = (a^b)^c$ true ☐ false ☐

   $p \wedge q \equiv \neg(p \rightarrow \neg q)$ true ☐ false ☐

   For any real number x,
   $\lceil \lfloor x \rfloor \rceil = \lfloor x \rfloor$. true ☐ false ☐

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1. (5 points) Simplify, showing your work.
   $\log_2(40) - \log_2(5) =$

2. (10 points) Check the (single) box that best characterizes each item.

   Shorthand for the set of rationals. $\mathbb{R}$ ☐ $\mathbb{F}$ ☐ $\mathbb{Q}$ ☐ $\mathbb{B}$ ☐

   Assume x is real.
   If $x^2 < 0$, then x is even. true ☐ false ☐ undefined ☐

   7 is a rational number true ☐ false ☐

   $(p \wedge q) \vee r \equiv (p \vee r) \wedge (q \vee r)$ true ☐ false ☐

   $\neg(\neg p \to \neg q) \equiv \neg p \wedge q$ true ☐ false ☐

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1. (5 points) Simplify, showing your work.

   $x - \dfrac{x^2 - 2}{x - \sqrt{2}} =$

2. (10 points) Check the (single) box that best characterizes each item.

   $-5 \in \mathbb{Z}$ true ☐ false ☐

   $\exists n \in \mathbb{Z}$, $n \geq 3$ and $n \leq 3$. true ☐ false ☐ undefined ☐

   For some real number x,
   $\lceil x \rceil \leq \lfloor x \rfloor$. true ☐ false ☐

   $(p \wedge \neg p) \rightarrow q$ true ☐ false ☐ depends on q ☐

   For any real numbers x and y,
   if $x \leq y$, then $x^2 \leq y^2$. true ☐ false ☐

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1. (5 points) Simplify, showing your work.

$$\frac{1}{(\frac{1}{2})^4 + (-\frac{1}{2})^5} =$$

2. (10 points) Check the (single) box that best characterizes each item.

$0 \in \mathbb{Z}$ true ☐ false ☐

If $\pi < 7$, then $3 < 1$ true ☐ false ☐ undefined ☐

For any real number x, $2\lfloor x \rfloor \leq \lfloor 2x \rfloor$ true ☐ false ☐

$\neg(p \to q) \equiv \neg p \to \neg q$ true ☐ false ☐

$\binom{n}{k}$ $\frac{n}{k}$ ☐ $\frac{n!}{k!}$ ☐ $\frac{k!}{n!}$ ☐ $\frac{n!}{k!(n-k)!}$ ☐ $\frac{n!}{k!(k-n)!}$ ☐

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1. (5 points) Simplify, showing your work.

$$\frac{1}{(\frac{1}{2})^4 + (-\frac{1}{2})^6} =$$

2. (10 points) Check the (single) box that best characterizes each item.

$0 \in \mathbb{Z}^+$ true ☐ false ☐

For any integer x,
if x is positive, then x is a real number. true ☐ false ☐

$\log_5 7 < 1$ true ☐ false ☐

$\exists n \in \mathbb{Z}$, such that $n^2 = 10$. true ☐ false ☐ undefined ☐

$\exists n \in \mathbb{Z}$, such that $n^2 = 1$. true ☐ false ☐ undefined ☐

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1. (5 points) Simplify, showing your work.
   $\log_3(45x) - \log_3(5x) =$

2. (10 points) Check the (single) box that best characterizes each item.

   $0 \in \mathbb{R}$ true ☐ false ☐

   If $\pi > 7$, then $3 < 1$ true ☐ false ☐ undefined ☐

   0! 0 ☐ 1 ☐ -1 ☐ undefined ☐

   $p \wedge \neg q \equiv \neg(p \rightarrow q)$ true ☐ false ☐

   2 is in the interval $(0, 2)$. true ☐ false ☐

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1. (5 points) Express $\frac{1}{2}[(2\log_2 a + \log_2 b) - 5\log_2 c]$ as a single logarithm.

2. (10 points) Check the (single) box that best characterizes each item.

$\sqrt{-1} \in \mathbb{C}$ true ☐ false ☐

For any real number x,
if $x > 10$, then $x^2 > 0$. true ☐ false ☐

For any integer x, $\lfloor x \rfloor = x$. true ☐ false ☐

$\neg(p \to q) \equiv \neg q \to \neg p$ true ☐ false ☐

$5 \in \mathbb{Q}$ true ☐ false ☐