

Name: _____

NetID: _____

Lecture: A B

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

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

$$2^{\log_4 n} =$$

Solution: $2^{\log_4 n} = (4^{1/2})^{\log_4 n} = (4^{\log_4 n})^{1/2} = n^{1/2}$

Also ok to use the change of base formula and/or express the result as $\sqrt{n}$.

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

$$\neg(p \wedge \neg q) \equiv \neg p \wedge q$$

true

☐

false

☒

Shorthand for the set of integers.

 $\mathbb{J}$ ☐ $\mathbb{N}$ ☐ $\mathbb{W}$ ☐ $\mathbb{Z}$ ☒

For any reals x and y ,

$$\lfloor x - y \rfloor = \lfloor x \rfloor - \lfloor y \rfloor.$$

true

☐

false

☒

For any real number x ,

$$\text{if } |x + 5| \leq 10, \text{ then } |x| \leq 20.$$

true

☒

false

☐

$$\log_2 3 < \log_3 2$$

true

☐

false

☒

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1. (5 points) Multiply out and simplify, showing your work.

$$(x^{x-2} + x^2)^2 =$$

Solution:

$$(x^{x-2} + x^2)^2 = (x^{x-2})^2 + 2x^{x-2}x^2 + (x^2)^2 = x^{2x-4} + 2x^x + x^4$$

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

$$\sqrt{2} \in \mathbb{Q}$$

true

☐

false

☒

$$\exists n \in \mathbb{Z}, n \geq 3 \text{ and } n \leq 3.$$

true

☒

false

☐

undefined

☐

$$\neg(p \rightarrow q) \equiv \neg q \rightarrow \neg p$$

true

☐

false

☒

$$\lfloor -3.4 \rfloor + \lceil -3.4 \rceil$$

-6

☐

-6.8

☐

-7

☒

-8

☐

For any real number x ,
if $x > 10$, then $x \geq 10$.

true

☒

false

☐

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

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

$$\text{Solution: } \frac{1}{(\frac{1}{2})^4 + (-\frac{1}{2})^5} = \frac{1}{\frac{1}{16} - \frac{1}{32}} = \frac{1}{\frac{2-1}{32}} = \frac{1}{\frac{1}{32}} = 32$$

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

$6 \in \mathbb{C}$

true

☒

false

☐

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

true

☐

false

☒

For any real number x , $\lfloor x \rfloor \leq \lceil x \rceil$.

true

☒

false

☐

$(p \vee \neg p) \rightarrow q$

true

☐

false

☐

depends on q

☒

If U. Illinois is in Paris,
then $\pi < 0$.

true

☒

false

☐

undefined

☐

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

$$(\log_2 17)(\log_{17} 64) =$$

Solution: $(\log_2 17)(\log_{17} 64) = \log_2 64 = 6$

If you don't understand the first step, look up the change of base formula.

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

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

true

☐

false

☒

undefined

☐

7 is a rational number

true

☒

false

☐

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

true

☒

false

☐

$\sqrt{2} \in \mathbb{R}$

true

☒

false

☐

For any real numbers x and y ,
 if $x \leq 6$ and $y \leq 2$, then $x - y \leq 4$.

true

☐

false

☒

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

$$\frac{1}{(\frac{1}{2})^{10} + (-\frac{1}{2})^{11}} =$$

$$\textbf{Solution: } (\frac{1}{2})^{10} + (-\frac{1}{2})^{11} = (\frac{1}{2})^{10} + (-\frac{1}{2})(\frac{1}{2})^{10} = (1 - \frac{1}{2})(\frac{1}{2})^{10} = (\frac{1}{2})(\frac{1}{2})^{10} = (\frac{1}{2})^{11}$$

$$\text{So } \frac{1}{(\frac{1}{2})^{10} + (-\frac{1}{2})^{11}} = 2^{11}$$

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

$$p \wedge q \equiv \neg(p \rightarrow \neg q)$$

true

☒

false

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

true

☒

false

☐For any real numbers x and y ,if $xy \leq 17y$, then $x \leq 17$.

true

☐

false

☒

Shorthand for the set of rationals.

 $\mathbb{R}$ ☐ $\mathbb{F}$ ☐ $\mathbb{Q}$ ☒ $\mathbb{B}$ ☐

$$3^{\lfloor -1.5 \rfloor} =$$

-3

☐ $\frac{1}{9}$ ☒ $\frac{1}{3\sqrt{3}}$ ☐ $\frac{1}{3}$ ☐

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

$$\frac{(2^3 \times 2^5)^{10}}{512} =$$

$$\text{Solution: } \frac{(2^3 \times 2^5)^{10}}{512} = \frac{(2^{3+5})^{10}}{2^9} = \frac{2^{80}}{2^9} = 2^{71}$$

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

$$p \rightarrow q \equiv \neg q \rightarrow \neg p$$

true

☒

false

☐

$$\text{If } \pi > 7, \text{ then } 3 < 1$$

true

☒

false

☐

undefined

☐

$$\lfloor -3.4 \rfloor$$

-3

☐

-4

☒

3.4

☐

undefined

☐The interval $[a, b]$ contains b .

true

☒

false

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

true

☒

false

☐