Math 099 - Final Exam

December 5, 2018

Name __key__

Score _____

Show all work. Supply explanations when necessary. Partial credit will be awarded for correct work. You may use your calculator unless otherwise indicated.

1. (2 points) Which specific operation would you do first in the following expression? (Tell exactly what operation you should do.)

$$4 \cdot (3^2 - 17) + 9$$

$3^2 = 9$ COMES FIRST

2. (2 points) Which specific operation would you do first in the following expression? (Tell exactly what operation you should do.)

$$100 \times (1.0225)^{4 \times 20}$$

$4 \times 20 = 80$ COMES FIRST

3. (4 points) Evaluate each expression **without using a calculator**. Show your work.

    (a) $7 - 4 \cdot (-2) = 7 + 8 = \boxed{15}$

    (b) $(2-2) - 2^2 - 2 - [2 \times (2-2)] = 0 - 4 - 2 - [2 \times 0]$
    $$= -4 - 2 = \boxed{-6}$$

4. (1 point) Give an example of a whole number that is not a natural number.

    $\boxed{0}$

5. (1 point) Give an example of a rational number that is not an integer.

    $\boxed{1.5 = \dfrac{3}{2}}$

1

6. (2 points) Let $A = \{x \mid x \in \mathbb{N} \text{ and } x < 8\}$. Rewrite A in roster notation.

$$A = \{1, 2, 3, 4, 5, 6, 7\}$$

7. (2 points) Let $D = \{x \mid x = 3k + 2 \text{ and } k \in \mathbb{N}\}$.

   (a) Give an example of a natural number that is an element of D.

$$k = 1 \implies \boxed{X = 5}$$

   (b) Give an example of a natural number that is not an element of D.

   $\boxed{1}$ IS NOT 2 MORE THAN A MULTIPLE OF 3.

8. (6 points) Identify each compound equation or inequality as a disjunction or a conjunction, then solve.

   (a) $-2x + 7 < 1$ and $6x - 10 < 20$ CONJUNCTION

$$-2x < -6 \qquad\qquad 6x < 30$$
$$\text{AND}$$
$$x > 3 \qquad\qquad\qquad x < 5$$

   $\boxed{X > 3 \text{ AND } X < 5} \implies \{x \mid 3 < x < 5\}$

   (b) $3x + 5 = 2x + 2$ or $8x = 7$

   DISJUNCTION

   $$\boxed{X = -3 \quad \text{OR} \quad X = \frac{7}{8}}$$

2

9. (4 points) Use your calculator to evaluate each expression.

(a) $\dfrac{7.25 \times (8.5 - 3.75)}{16.85 - 9.1}$ $=$ 4.443548...

(b) $\left(1 + \dfrac{0.08725}{12}\right)^{12 \times 25}$ $=$ 8.78774...

10. (4 points) Use your calculator to evaluate each expression at the given values.

(a) $P \cdot \left(1 + \dfrac{r}{n}\right)^{nt}$ when $P = 1{,}500$, $r = 4.15\%$, $n = 2$, and $t = 25$
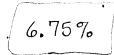
$\approx$ 4188.52

(b) $R \cdot \left[1 - \left(1 + \dfrac{r}{n}\right)^{-nt}\right]$ when $R = 1000$, $r = 8.25\%$, $n = 12$, and $t = 15$

$\approx$ 708.66

11. (2 points) Round each number to the indicated place.

(a) $8{,}657{,}331.95$ to the nearest thousand
$\uparrow$

8,657,000.00

(b) 59.82645 to the nearest ten thousandth
$\uparrow$

59.82650

3

12. (1 point) Write 9.375% in decimal form.

$$0.09375$$

13. (1 point) Write 0.0675 in percent form.

$$6.75\%$$

14. (2 points) What is 20% of 150?

$$0.20 \times 150 = \boxed{30}$$

15. (2 points) What percent of 75 is 5?

$$\square \times 75 = 5$$

$$\frac{5}{75} = 0.0666\ldots = \boxed{6.6\overline{6}\%}$$

16. (2 points) 15% of what is 90?

$$0.15 \times \square = 90$$

$$\frac{90}{0.15} = \boxed{600}$$

17. (2 points) The advertised price of a 2nd generation Amazon Echo Plus is $149.99. The sales tax rate is 8.75%. What is the total cost of the device?

$$\text{Tax} = 0.0875 \times 149.99 = 13.12$$

$$149.99 + 13.12$$

$$= \boxed{\$163.11}$$

4

18. (3 points) How much time is required to double an investment at 5.25% simple interest?

$$P = 100 \Rightarrow A = 200$$
$$\Rightarrow I = 100 \qquad 100 = 100(0.0525)t$$
$$t = \frac{1}{0.0525} \approx \boxed{19.05 \text{ yrs}}$$

19. (2 points) If you knew the value of 999!, how could you use it to compute 1000!?

$$1000! = 999! \times 1000$$

20. (5 points) Compute each of the following.

(a) 9!

$$9 \times 8 \times 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = \boxed{362,880}$$

(b) $\frac{215!}{213!}$ $= \dfrac{215 \times 214 \times 213!}{213!} = 215 \times 214 = \boxed{46,010}$

(c) $\frac{25!}{3!\,22!}$ $= \dfrac{25 \times \overset{4}{\cancel{24}} \times 23 \times \cancel{22!}}{\cancel{3} \times \cancel{2} \times 1 \times \cancel{22!}} = 25 \times 4 \times 23$

$$= \boxed{2300}$$

5