

Math 200 - Test 1

February 16, 2011

Name _____

Score _____

Show all work to receive full credit (even on multiple-choice problems). Supply explanations when necessary.

1. (4 points) Clearly state the four steps of the problem-solving process (in order).

2. (3 points) State three different strategies for devising a plan.

3. (3 points) Use the technique we discussed in class to compute the sum:

$$1 + 2 + 3 + 4 + \cdots + 247 + 248.$$

4. (1 point) When using the 4-step, problem-solving process which one of these strategies WOULD NOT BE considered part of carrying out the plan?

- (a) Implement the plan you devised.
- (b) Keep a record of your work.
- (c) Check each step.
- (d) Try other possible solution methods.

5. (1 point) What type of reasoning are you using when you draw a conclusion based on observation?
- (a) Inductive reasoning
 - (b) Recursive thinking
 - (c) Deductive reasoning
 - (d) Circular reasoning

6. (1 point) What is the name of the type of sequence shown here?

$$8, 17, 26, 35, 44, 53, \dots$$

- (a) Geometric sequence
 - (b) Arithmetic sequence
 - (c) Sequence with fixed higher-order difference
 - (d) Random sequence
7. (1 point) Which one of these is not a well-defined set?
- (a) $\{3, 4, 11, 18, 22, 25, 32, 36, 43\}$
 - (b) \emptyset
 - (c) The set of all freshwater fish
 - (d) The set of all great books
8. (1 point) Which one of the following sets can be placed into a one-to-one correspondence with the set of days of the week?
- (a) \emptyset
 - (b) The set of real numbers less than 7
 - (c) $\{1, x, 3, F, 13, \ell, g\}$
 - (d) $\{s, m, t, w, f\}$

9. (1 point) Find the 915th term of the following arithmetic sequence:

$$1, 5, 9, 13, 17, 21, 25, \dots$$

- (a) 3657
- (b) 3660
- (c) 3661
- (d) 2915

10. (3 points) Is the following statement true or false? After stating your answer, give two examples or two counterexamples.

$$\text{For any whole number } x, (x + 5)^2 = x^2 + 25.$$

11. (2 points) When referring to sets, what is the difference between *equal* and *equivalent*?

12. (1 point) Let Z be the set of the letters of the word *excellent*. Write Z in roster (listing) notation.

13. (1 point) For two sets A and B , what must be true if $A \not\subseteq B$?

14. (2 points) Is 9500 a term of the following sequence?

$$8, 15, 22, 29, 36, 43, \dots$$

15. (1 point) What does it mean for a set to be well defined?

16. (3 points) On day 1, a woman discovers a great new shampoo. On day 2, she tells two friends. On day 3, each of her friends tells two friends. This pattern continues.

(a) Make a table showing the day number and the number of people learning about the shampoo on that day. Include the first 5 days in your table.

(b) What kind of sequence is described by your table? Find a formula for the n th term of the sequence.

17. (1 point) Which of one of these mathematicians is associated with the following famous sequence?

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, ...

- (a) Bernhard Riemann
- (b) Gerolamo Cardano
- (c) Fibonacci
- (d) Carl Friedrich Gauss

18. (4 points) A farmer needs to fence a rectangular field. She wants the length of the field to be 80 ft longer than the width. If she intends to use 1080 ft of fencing material, what should the length and width of the field be?

19. (1 point) Write the following set in roster (listing) notation.

$$\{x \mid x = 3n \text{ and } n \in \mathbb{N}\}$$

20. (3 points) The first difference of a sequence is 3, 6, 9, 12, 15, The fifth term of the original sequence is 34. Find the first six terms of the original sequence.

21. (2 points) List all the subsets of $\{a, b\}$.

22. (3 points) Rewrite each of the following statements using mathematical symbols.

(a) b is an element of the set M .

(b) The empty set is a subset of the set B .

(c) The cardinality of the set Z is 24.

23. (3 points) Let $A = \{2, 5, 8, 11, 14, \dots, 650\}$. Find $n(A)$.

24. (1 point) Let U be the set of all PSC students, and let M be the set of all PSC math students. Describe an element of the set \overline{M} .

25. (3 points) Let $A = \{2, 4, 6, 8\}$, $B = \{2, 6, 8\}$, and $C = \{2, 3, 4\}$. In each of the following, insert an appropriate symbol \sim , \in , or \subseteq to make the statement true.

(a) B _____ A

(b) $\{3\}$ _____ C

(c) C _____ B