

Your exam will be identical in format to this review. Only the actual numerical values in the questions will vary.

Part 1: Multiple-Choice—Choose the best answer of the choices provided. Write your answer clearly in the spaces provided below.
(40 questions—2 points each = 80 points)

Part 2: Free-Response—Prove each statement by mathematical induction.
(20 points total)

41	$\sum_{i=1}^n i^3 = \frac{n^2(n+1)^2}{4}$ <p>(6 points)</p>
42	$\sum_{i=1}^n 2 * 3^{n-1} = 3^n - 1$ <p>(7 points)</p>
43	$\left(\frac{4}{3}\right)^n > n \text{ for } n \geq 7$ <p>(7 points)</p>

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write out the first five terms of the sequence.

- 1) $a_n = 3n - 2$ 1) _____
 A) -1, -4, -7, -10, -13 B) 5, 8, 11, 14, 17
 C) 1, 4, 7, 10, 13 D) 1, 2, 3, 4, 5

- 2) $c_n = \frac{n+2}{n}$ 2) _____
 A) $\frac{2}{8}, \frac{2}{9}, \frac{2}{10}, \frac{2}{11}, \frac{2}{12}$ B) 1, 1, 1, 1, 1
 C) $3, 2, \frac{5}{3}, \frac{3}{2}, \frac{7}{5}$ D) $\frac{10}{8}, \frac{11}{9}, \frac{12}{10}, \frac{13}{11}, \frac{14}{12}$

Find the first six terms of the sequence.

- 3) $a_1 = 3, a_n = a_{n-1} + 5$ 3) _____
 A) 3, 5, 10, 15, 20, 25 B) 8, 13, 18, 23, 28, 33
 C) 3, 8, 13, 18, 23, 28 D) 0, 5, 10, 15, 20, 25

- 4) $a_1 = 6, a_2 = 7; \text{ for } n \geq 3, a_n = a_{n-1} + a_{n-2}$ 4) _____
 A) 6, 7, 42, 294, 12,348, 3,630,312 B) 6, 7, 13, 14, 20, 20
 C) 6, 7, 12, 18, 24, 30 D) 6, 7, 13, 20, 33, 53

Find an explicit rule for the nth term of the arithmetic sequence.

- 5) -3, 0, 3, 6, ... 5) _____
 A) $a_n = -3 + 3$ B) $a_n = -3 + 3(n)$
 C) $a_n = -3 + 3(n-1)$ D) $a_n = -3 + 3(n+1)$

- 6) $a_{19} = -1, a_{21} = -19$ 6) _____
 A) $a_n = 161 + 9(n + 1)$ B) $a_n = 161 - 9(n - 1)$
 C) $a_n = 161 - 9(n - 2)$ D) $a_n = 161 - 9(n + 1)$

Find an explicit rule for the nth term of the sequence.

- 7) -1, -2, -4, -8, ... 7) _____
 A) $a_n = 2 \cdot -1^{n+1}$ B) $a_n = -1 \cdot 2^n$ C) $a_n = -1 \cdot 2^{n-1}$ D) $a_n = 2 \cdot -1^n$

- 8) The second and fifth terms of a geometric sequence are -8 and 64, respectively. 8) _____
 A) $a_n = 4 \cdot 2^{n-1}$ B) $a_n = 4 \cdot (-2)^{n-1}$
 C) $a_n = 4 \cdot 2^n$ D) $a_n = 4 \cdot (-2)^{n+1}$

Find a recursive rule for the nth term of the sequence.

- 9) 5, 9, 13, 17, ... 9) _____
 A) $a_n = a_{n-1} + 4$ B) $a_n = a_{n-1} - 4$ C) $a_n = a_{n-1} + 5$ D) $a_n = a_{n-1} + 8$

- 10) The second and fifth terms of an arithmetic sequence are -11 and 4, respectively. 10) _____
 A) $a_n = a_{n-1} - 6$ B) $a_n = a_{n-1} + 11$ C) $a_n = a_{n-1} + 5$ D) $a_n = a_{n-1} + 6$

Solve.

- 11) A certain species of tree grows an average of 0.4 cm per week. Write an explicit rule for the sequence that represents the weekly height of this tree in centimeters if the measurements begin when the tree is 2 meters tall. 11) _____
 A) $h_n = 2000 + 0.4n$ B) $h_n = 2 + 0.4n$
 C) $h_n = 200 + 0.4n$ D) $h_n = 200 + 40n$

Write the series using summation notation.

- 12) $3 - 9 + 27 - 81 + \dots$ 12) _____
 A) $\sum_{n=0}^{\infty} 3 \cdot 3^{n+1}$ B) $\sum_{n=0}^{\infty} 3(-3)^{n+1}$
 C) $\sum_{n=0}^{\infty} 3(-3)^n$ D) $\sum_{n=0}^{\infty} 3 \cdot 3^n$

- 13) $11 + 13 + 15 + 17 + \dots + 2n+1 \dots$ 13) _____
 A) $\sum_{n=5}^{20} (2n+1)$ B) $\sum_{n=6}^{20} (2n+1)$ C) $\sum_{n=5}^{\infty} (2n+1)$ D) $\sum_{n=6}^{\infty} (2n+1)$

Find the sum of the arithmetic sequence.

- 14) -1, 2, 5, 8, 11, 14, 17 14) _____
 A) 63 B) -7 C) 56 D) 20
 15) 10, 15, 20, 25, ..., 65 15) _____
 A) 70 B) 420 C) 450 D) 430

Find the sum of the geometric sequence.

- 16) 1, 4, 16, 64, 256 16) _____
 A) 331 B) 339 C) 341 D) 337
 17) $3, \frac{3}{4}, \frac{3}{16}, \frac{3}{64}, \frac{3}{256}$ 17) _____
 A) $\frac{1}{64}$ B) $-\frac{1}{128}$ C) 1023 D) $\frac{1023}{256}$

Find the sum of the first n terms of the sequence.

- 18) 25, 28, 31, 34, ... ; $n = 11$ 18) _____
 A) 440 B) $\frac{605}{2}$ C) $\frac{913}{2}$ D) 498

19) 8, -24, 72, ... ; n = 12

A) - 6377296

B) 398581

C) - 1062880

D) 3188648

19) _____

Solve.

20) An auditorium has 25 rows with 10 seats in the first row, 12 in the second row, 14 in the third row, and so forth. How many seats are in the auditorium?

A) 550

B) 900

C) 850

D) 500

20) _____

21) A sequence of yearly payments of \$3000 is invested at an interest rate of 4.6%, compounded annually. What is the total amount of the annuity after 8 years?

A) \$29,240.70

B) \$27,240.70

C) \$28,240.70

D) \$27,740.70

21) _____

State an explicit rule for the nth term of the recursively-defined sequence.

22) $a_n = a_{n-1} + 9$; $a_1 = 3$

A) $a_n = 9 + 3(n-1)$

B) $a_n = 3 + 9(n-1)$

C) $a_n = 9 + 3(n)$

D) $a_n = 3 + 9(n)$

22) _____

23) $a_n = \left(\frac{1}{9}\right) \cdot a_{n-1}$; $a_1 = 4$

A) $a_n = 9 \cdot \left(\frac{1}{4}\right)^{n-1}$

B) $a_n = 4 \cdot \left(\frac{1}{9}\right)^{n-1}$

C) $a_n = 4 \cdot \left(\frac{1}{9}\right)^n$

D) $a_n = 9 \cdot \left(\frac{1}{4}\right)^n$

23) _____

Find the sum.

24) $6 + 8 + 10 + 12 + \dots + 306$

A) 23,864

B) 23,556

C) 23,250

D) 46,206

24) _____

25)

$$\sum_{k=1}^n (k^2 + 8k + 15)$$

A) $\frac{n(n+1)(2n+1)}{6} + \frac{8n(n+1)}{2}$

B) $\frac{n(n+1)(2n+1)}{6} + \frac{8n(n+1)}{2} + 15n$

C) $\frac{n(n+1)(2n+1)}{6} + 15n$

D) $\frac{8n(n+1)}{2} + 15n$

25) _____

Find the probability of the event.

26) Give the probability that the roll of a die will show 3 or 6.

A) $\frac{1}{3}$

B) 2

C) 1

D) $\frac{1}{2}$

26) _____

- 27) Two 6-sided dice are rolled. What is the probability that the sum of the two numbers on the dice will be greater than 9? 27) _____
- A) $\frac{1}{4}$ B) $\frac{1}{6}$ C) $\frac{1}{12}$ D) 6

Solve the problem.

- 28) A box contains 4 slips of paper, on each of which is written the number 1, 2, 3, or 4, respectively. A slip is drawn and the number on it is noted. That slip is put aside, another drawn, and the number on it noted. What is the probability that 28) _____
- a) the sum of the two numbers is 5?
 b) the first number drawn is a 2 and the second number is not 5?
 c) the sum of the two numbers is not 10?
- A) a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) 1 B) a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) 0
 C) a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) 1 D) a) $\frac{1}{3}$ b) $\frac{1}{4}$ c) 0

Find the probability.

- 29) The maker of a certain candy claims that the proportions of colors of candy produced are: 0.2 red, 0.4 blue, 0.2 green, 0.1 purple and 0.1 yellow. What is the probability that a randomly selected candy from a newly-opened bag will be blue or red? 29) _____
- A) 1 B) 0.6 C) 0.2 D) 0.4

Find the mean for the given sample data.

- 30) Six college students spent \$254.03, \$134.55, \$139.51, \$218.89, \$241.51, and \$189.58 respectively for books. Compute the mean amount spent. Round your answer to the nearest cent. 30) _____
- A) \$294.52 B) \$223.61 C) \$196.35 D) \$235.61

Expand the binomial.

- 31) $(a - b)^6$ 31) _____
- A) $a^6 + 6a^5b + 15a^4b^2 + 20a^3b^3 + 15a^2b^4 + 6ab^5 + b^6$
 B) $-a^6 + 6a^5b - 15a^4b^2 + 20a^3b^3 - 15a^2b^4 + 6ab^5 - b^6$
 C) $a^6 - 6a^5b - 15a^4b^2 - 20a^3b^3 - 15a^2b^4 - 6ab^5 - b^6$
 D) $a^6 - 6a^5b + 15a^4b^2 - 20a^3b^3 + 15a^2b^4 - 6ab^5 + b^6$
- 32) $(4x + 3)^4$ 32) _____
- A) $256x^3 + 768x^2 + 864x + 432$ B) $(16x^2 + 12x + 9)^4$
 C) $256x^4 + 768x^3 + 864x^2 + 432x + 81$ D) $768x^4 + 2304x^3 + 864x^2 + 1296x + 81$
- 33) $(\sqrt{x} + \sqrt{5})^4$ 33) _____
- A) $x^2 + 4x\sqrt{5x} + 11x + 9\sqrt{5x} + 25$ B) $x^2 + 4x\sqrt{5x} + 30x + 20\sqrt{5x} + 25$
 C) $x^2 + 4x\sqrt{5x} + 6x + 4\sqrt{5x} + 5$ D) $x^2 + 25$

Find the coefficient of the given term in the binomial expansion.

34) x^4y^1 term, $(x + y)^5$ 34) _____
A) 10 B) 4 C) 20 D) 5

35) x^6 term, $(x - 3)^9$ 35) _____
A) -2268 B) 84 C) -252 D) 2268

Answer the question.

36) In how many ways can you answer the questions on an exam that consists of 11 true-false questions? 36) _____
A) 2168 B) 2128 C) 1984 D) 2048

37) How many automobile license plates can be made involving 2 letters followed by 3 digits? 37) _____
A) 665,744 B) 676,000 C) 1676 D) 696,500

Evaluate.

38) $6P_2$ 38) _____
A) 30 B) 15 C) 360 D) 48

39) $7!$ 39) _____
A) 720 B) 5040 C) 10,080 D) 2520

40) $5C_1$ 40) _____
A) 5 B) 2.5 C) 120 D) 48

Answer Key

Testname: HA2PC_CH9(PC)_REVIEW

- 1) C
- 2) C
- 3) C
- 4) D
- 5) C
- 6) B
- 7) C
- 8) B
- 9) A
- 10) C
- 11) C
- 12) C
- 13) C
- 14) C
- 15) C
- 16) C
- 17) D
- 18) A
- 19) C
- 20) C
- 21) C
- 22) B
- 23) B
- 24) B
- 25) B
- 26) A
- 27) B
- 28) A
- 29) B
- 30) C
- 31) D
- 32) C
- 33) B
- 34) D
- 35) A
- 36) D
- 37) B
- 38) A
- 39) B
- 40) A