

MATHEMATICS Section Exam 1: General Mathematics



- 1) In how many distinct ways can eight people sit in a circle?
- a. 36
 - b. 120
 - c. 5,040
 - d. 10,080
 - e. 26,650
- 2) A florist can make bouquets including at least 1 and up to $n - 1$ flower varieties from a total of $2n - 1$ varieties. Find n if 63 types of bouquets are available.
- a. 3
 - b. 4
 - c. 5
 - d. 6
 - e. 7
- 3) In how many ways can a store schedule 5 workers for a week of overnight shifts, if workers may not work consecutive nights and each shift needs 2 people?
- a. 2,187
 - b. 2,430
 - c. 4,860
 - d. 7,290
 - e. 10,935
- 4) 11 people are to be seated on a long table with 5 seats on either side and 1 seat at the head. The group includes 2 couples who want to be seated opposite each other. How many possible seating arrangements are there?
- a. 403,200
 - b. 504,000
 - c. 126,000
 - d. 201,600
 - e. 252,000
- 5) Q and R are independent events. $p(Q) = 0.66$ and $p(Q \text{ and } R) = 0.37$. What is $p(R)$?
- a. 0.29
 - b. 0.32
 - c. 0.39
 - d. 0.52
 - e. 0.56

- 6) 28% of the working-age American population are actively looking for work. Of them, 11.5% have an existing job. Find the probability that a randomly selected working-age American resident is trying to leave their current job.
- a. 0.0322
 - b. 0.0462
 - c. 0.0828
 - d. 0.115
 - e. 0.165
- 7) On any given day, there is a 0.36 probability that the subway is crowded. Mark is always on time when the subway isn't crowded, but when the subway is crowded, Mark has a 50% chance of being late to school. What is the probability that Mark is late exactly 1 day out of 10?
- a. 0.06485
 - b. 0.92362
 - c. 0.07638
 - d. 0.01153
 - e. 0.30172
- 8) At what initial deposit would an account with 4% annual interest, compounded monthly, be worth \$12,000 after 6 years?
- a. \$1,548.02
 - b. \$2,135.74
 - c. \$2,850.37
 - d. \$9,443.30
 - e. \$9,483.77
- 9) How many unique 5-digit numbers can be formed with digits 0 to 5 with no reused digits?
- a. 120
 - b. 240
 - c. 270
 - d. 600
 - e. 720
- 10) \$10,000 is deposited in an account with annually compounded interest. If the account has \$10,521.91 after 4 years, what is the interest rate?
- a. 1.28%
 - b. 1.33%
 - c. 1.41%
 - d. 1.46%
 - e. 1.52%

- 11) A 6-digit integer is to be formed using the digits 1, 2, 3 such that the digits sum to 8. How many integers can be formed?
- a. 486
 - b. 162
 - c. 81
 - d. 21
 - e. 36
- 12) Suppose we have a collection of 12 distinct points. Four of them lie on a line, but no other line passes through more than two of them. How many triangles can be formed from this set of possible vertices?
- a. 216
 - b. 220
 - c. 330
 - d. 2,966
 - e. 2,970
- 13) In how many ways can 7 puppies be adopted by 3 different households, assuming every household adopts at least 1 puppy? The puppies are distinct.
- a. 293
 - b. 343
 - c. 729
 - d. 1,806
 - e. 2,056
- 14) A sum of money is split evenly and deposited into 2 accounts that offer 8% per annum. 1 account pays simple interest. The other pays annual compound interest. After 2 years, the difference in account value is \$1902.56. What is the original sum?
- a. \$594,550
 - b. \$22,867
 - c. \$15,245
 - d. \$12,650
 - e. \$11,434
- 15) The probability that the House changes hands in the next election is 0.2; the probability the Senate does is 0.65. The probability that the House flips given the Senate flips is 0.3. What is the probability that the majority in the House or Senate changes?
- a. 0.060
 - b. 0.195
 - c. 0.308
 - d. 0.462
 - e. 0.655

- 16) John Delaney wants to visit all 99 of Iowa's counties again by 2024, but only has time for 3 on his next trip. How many choices of 3 counties does he have?
- a. 470,547
 - b. 209,132
 - c. 156,849
 - d. 104,566
 - e. 52,283
- 17) A company produces switches that work 95% of the time. If a technician is wiring 40 of the switches into circuits, find the probability no more than 2 circuits remain faulty.
- a. 0.399
 - b. 0.548
 - c. 0.677
 - d. 0.712
 - e. 0.750
- 18) If $p\left(\begin{smallmatrix} n-1 \\ r \end{smallmatrix}\right) = \left(\begin{smallmatrix} n \\ r+1 \end{smallmatrix}\right)$, what is p ?
- a. $\frac{n}{r+1}$
 - b. $\frac{n}{r}$
 - c. $(n-2)(r-2)$
 - d. $\frac{n-1}{r-1}$
 - e. $\frac{r}{n+1}$
- 19) If an unbiased coin is flipped 8 times consecutively, what is the probability of obtaining at least 1 head and 1 tail?
- a. 0.957
 - b. 0.977
 - c. 0.988
 - d. 0.992
 - e. 0.996
- 20) In Morse code, dots represent 1 unit of time and dashes 3 units. In how many ways can a sequence lasting 11 units be signaled?
- a. 41
 - b. 45
 - c. 62
 - d. 63
 - e. 82
- 21) A variable is binomially distributed such that $p(\text{at least 1 success in 6 trials}) = 0.822$. For an individual trial, what is the probability of success?
- a. 0.470
 - b. 0.235
 - c. 0.178
 - d. 0.250
 - e. 0.292

- 22) A bank offers an investment that has a 1.5% chance of total loss, a 31.5% chance of breaking even, and a 67% chance of appreciating 20%. What is the expected return on \$20,000?
- a. \$2,426
 - b. \$2,554
 - c. \$2,689
 - d. \$2,721
 - e. \$2,380
- 23) $n + 2$ identical vases and n identical pots are to be arranged in line such that no 2 pots are adjacent. How many arrangements are possible?
- a. $\frac{n+2!}{n!}$
 - b. $24(n)(n+2)$
 - c. $\frac{n+3!}{6(n!)}$
 - d. $\frac{n}{24} n + 2!$
 - e. $\frac{n+2!}{2!n!}$
- 24) A stats 101 course has a historic pass rate of 98%. What is the probability that this cohort of 100 students will underperform the average?
- a. 0.133
 - b. 0.271
 - c. 0.273
 - d. 0.323
 - e. 0.455
- 25) Jeremy is making his best burger yet. He has four options for his bun type, three options for meat, three cheese options, six options for vegetable toppings, and three condiments. He will choose exactly one of each option except for vegetables, where he will choose at least one and no more than three. How many unique burgers can he make?
- a. 4,428
 - b. 16,480
 - c. 28,282
 - d. 56,720
 - e. 194,400
- 26) A factory has a daily capacity of 3,000 pocket knives. On average, it produces 1 subpar pocket knife for every 600 knives produced. What is the probability that produces fewer than 3 subpar pocket knives on a given production day?
- a. 0.124
 - b. 0.158
 - c. 0.215
 - d. 0.241
 - e. 0.248

- 27) In how many ways can 20 people be divided into 5 non-distinct groups of 4?
- a. 509,233,725
 - b. 244,432,188
 - c. 3,910,915,008
 - d. 488,864,378
 - e. 2,546,168,625
- 28) $\frac{n}{r-1} = 36$; $\frac{n}{r} = \frac{n!}{r!(n-r)!} = 84$; $\binom{n}{r+1} = 126$. What is r ?
- a. 3
 - b. 4
 - c. 6
 - d. 7
 - e. 8
- 29) The probability of a 1990s fad revival is 0.36 and the probability of a 1920s fad revival is 0.51. The probability that a fad from the 1920s and one from the 1990s is cool again is 0.17. What is the probability neither decade's fads make a comeback?
- a. 0.13
 - b. 0.30
 - c. 0.34
 - d. 0.45
 - e. 0.51
- 30) How long will it take for a deposit to increase in value by two-thirds if the account offers 5% interest compounded quarterly?
- a. 10 years, 6 months
 - b. 23 years, 2 months
 - c. 24 years, 7 months
 - d. 28 years, 1 month
 - e. 33 years, 4 months
- 31) What is the probability that if 6 dice are rolled simultaneously, the faces come up either all even or all odd?
- a. 0.0625
 - b. 0.0417
 - c. 0.0313
 - d. 0.0214
 - e. 0.0156
- 32) In how many ways can a college major and minor be chosen, if there are 26 possible majors and 38 possible minors, but 8 of these minors can only be taken with the 4 pre-med majors?
- a. 812
 - b. 796
 - c. 780
 - d. 750
 - e. 724

- 33) If a plane has a 0.55 chance of landing on time on any given flight, what is the probability it lands late on exactly 4 out of 6 flights?
- a. 0.372
 - b. 0.364
 - c. 0.275
 - d. 0.186
 - e. 0.182
- 34) 18 students have to be divided evenly into 3 non-distinct teams. If 3 students want to be on different teams from each other, how many ways of dividing the students are there?
- a. 1,324,008
 - b. 827,505
 - c. 504,384
 - d. 1,103,340
 - e. 756,576
- 35) What is the probability of randomly pulling a card that is neither red nor an ace from a standard 52-card deck?
- a. 0.462
 - b. 0.231
 - c. 0.385
 - d. 0.269
 - e. 0.423