Unless otherwise indicated, give all probabilities to 5 decimal places.

1. On the standard normal curve, what is the probability that a data value is between \(-0.8\) and 0.75?

2. Steve invested a sum of money 4 years ago in a savings account that paid interest at the rate of 3.58\% per year compounded quarterly. Steve’s investment is now worth $18,945.46. How much did he originally invest? What is the effective rate of interest?

3. \(P(Z \geq 0.3939) = \)

4. Sketch the area under the standard normal curve corresponding to \(P(-0.2 \leq Z < 0.3)\). Evaluate \(P(-0.2 \leq Z < 0.3)\).
5. The scores of a detective exam are normally distributed with a mean of 68 and a standard deviation of 11.

   a. If the instructor assigns A’s to 8%, B’s to 12%, C’s to 35%, D’s to 12%, and F’s to the rest, find the cutoff points for these grades.

   b. Find the probability that a detective student selected at random scores more than an 85.

   c. Find the probability that a detective student selected at random scores between 65 and 90.

   d. Find the probability that a detective student selected at random scores no more than 55.

6. $P(Z > -0.4567) =$
7. Find the accumulated amount after 12 years if $60,000 is invested at 4.36% per year compounded continuously. What is the APY?

8. \( P(Z \leq -0.2354) = \)

9. If \( \mu = 60, \sigma = 10, \) and \( X \) is a normal random variable, evaluate \( P(X \leq 58) \).

10. If you invest $2000 at 5% per year interest compounded quarterly,
    
    a. How much would you have at the end of 3 years?

    b. What is the effective yield, to 4 decimal places?
11. Scanners have an average life of 8200 hours with a standard deviation of 640 hours. The normal distribution closely represents the scanner’s life.

   a. Find the probability that a scanner selected at random can be expected to last no more than 8000 hours.

   b. Find the probability that a scanner selected at random can be expected to last between 8100 and 8350 hours.

   c. If a store receives four dozen scanners, how many would you expect to last more than 9000 hours?

   d. How many scanner hours correspond to the 80th percentile?

12. A bank deposit paying simple interest at a rate of 7.24% per year grew to $3700.23 in 11 months. What was the principal?

13. If $\mu = 25$, $\sigma = 4$, and $X$ is a normal random variable, evaluate $P(18 < X \leq 24)$. 
14. How many years would it take $8000 to grow to $16,331.15 at 5.75% per year interest compounded quarterly?

15. The mass of meteors that strike the Earth each year is normally distributed with a mean of $10^7$ kg and a standard deviation of $5^8$ kg.
   
   a. What is the minimum mass that is more than 66% of the meteors?

   b. What two masses, that are symmetric about the mean, enclose the middle 20% of all meteor masses?

16. What is the value of $z$ if $P(Z > z) = 0.8827$?
17. If you borrow $9348 at 5% simple interest per year, how much will you owe after 20 months?

18. If \( \mu = 130, \sigma = 18, \) and \( X \) is a normal random variable, evaluate \( P(X > 120) \).

19. Twenty years ago $20,000 was placed in a trust that earned interest at a rate of 4.95% per year compounded weekly. What is the trust worth today? What is the annual percentage yield?

20. What is the value of \( z \) if \( P(\text{\textminus}z < Z < z) = 0.6263 \)?
21. If you invest $24,456.94 in an account earning 3.45% interest per year compounded continuously, how much money would you have after 30 months? What is the annual percentage yield?

22. What is the interest rate per year compounded daily if the principal amount of $14,689 grows to $17,700.44 in 5 years? What is the APY?

23. Given $X$ is a normal random variable with a mean of 3456 and a standard deviation of 234.
   
   a. Find the value of $a$ such that $P(X \leq a) = 0.4545$.

   b. Find the value of $a$ such that $P(X > a) = 0.8787$.

   c. Find the values of $a$ and $b$ such that $P(a < X \leq b) = 0.2424$ if $a$ and $b$ are symmetric about the mean.
24. Find the effective rate of interest corresponding to a nominal rate of 4.65% compounded
   
   a. Daily

   b. Monthly

   c. Semiannually

   d. Annually

   e. Continuously

25. Find the accumulated amount at the end of 7 months on an $8675.26 bank deposit paying simple interest at a rate of 3.45% per year.