Multiple Choice: Circle ONE answer for each of the following questions.

1. The given polygon is: Concave or Convex.

![Polygon](image)

2. The given polygon is: Regular or Irregular.

![Polygon](image)

3. Why is the given tiling not regular?

(a) It is not edge-to-edge.
(b) The tiles are not regular polygons.
(c) It is not monohedral.

4. The given tiling is semiregular? True or False.

![Tiling](image)
5. Which of the following polygons cannot tile the plane?

   (a) scalene triangle       (b) non-rectangular parallelogram
   (c) regular pentagon       (d) regular hexagon

6. Regular dodecahedrons (12-gons) and equilateral triangles can form a tiling of the plane that has at every vertex

   (a) two dodecahedrons and two triangles
   (b) two dodecahedrons and one triangle
   (c) one dodecahedron and two triangles
   (d) one dodecahedron and one triangle

7. A semi-regular tiling has one square, one regular hexagon, and one regular $p$-gon at each vertex. What is $p$?

   (a) 8       (b) 9
   (c) 10      (d) 12

8. The given polyhedron is: Concave or Convex.

![Convex Polyhedron]

9. The polyhedron below is a: Prism or Antiprism.

![Prismatic Polyhedron]

Short Answer Questions: For calculations, show how you set-up each problem to receive full credit.
10. Find the measure of one interior angle of a regular octagon.

11. Find the sum of the angles of a 13-gon.

12. Four of the five angles of a polygon are given as 29°, 91°, 137°, and 238°. Find the measure of the remaining angle.

13. State the different number of vertex types in the given tiling.

14. If a convex polyhedron has 8 faces and 12 vertices, how many edges does it have?

15. Suppose a convex polyhedron has 7 faces, of which 2 are triangles and 5 are quadrilaterals. How many edges and vertices does the polyhedron have?

16. Solve \((1 + x)^{20} = 6.04\) where \(x > 0\). Round to 5 decimal places.

17. Solve \(2^x = 109\). Round to 5 decimal places.

18. Find the annual interest rate \(r\) needed for the given principal to reach the given future value under simple interest for the time period specified. Round to the nearest hundredth.

\[ P = \$100, \; F = \$105, \; t = 8 \text{ months} \]

19. Find the annual percentage yield (APY) for the given interest rate compounded as specified. Round to the nearest hundredth.

\[ r = 2.75\% \text{ compounded daily} \]

20. Find the future value \(F\) for a systematic savings plan with the given deposits made at the ends of the compounding periods for the time period and interest rate specified. Round to the nearest cent.
21. Find the present value $P$ given the future value, time period and interest rate specified. Round to the nearest cent.

$$F = 10000, t = 15 \text{ years}, r = 4.5\% \text{ compounded quarterly}$$

22. A teenager would like to save $9000 toward the purchase of a used car. If he has $7800 now and can invest it at 6\% interest compounded monthly, how much time, in years, will he have to wait? Round to the nearest hundredth.

23. A family takes out a $168,500 mortgage at 6.5\% interest compounded monthly with monthly payments for 30 years.

(a) What would their monthly payments be? Round to the nearest cent.

(b) They decide to pay an extra $100 a month on the house payment. How much time, in years, will it take them to pay off the loan? Round to the nearest cent.

(c) How much will they save in payments over the life of the loan by paying $100 extra a month?

24. Find the quotient and remainder when using the division algorithm when -37 is divided by 11.

25. Evaluate $gcd(12, -56)$.

26. Evaluate the following:

(a) $-61mod5$

(b) $127mod8$

(c) $(13^{135}11^{12})mod12$

27. Determine if 1237 is a prime. Explain how you made your determination.

28. Encipher the message “ALL IS NOT LOST”, by breaking it into five-letter blocks and using the Caesar cipher:

29. Decipher the following message which was encoded using the affine cipher $C = (7P + 9)mod26$: *Note this has been modified on April 16*

NXJWE DMGNF

30. Encipher the message “CALL ME” using the given Hill cipher for two-letter blocks. Use the letter X as a dummy letter in the last block if necessary.

$$C_1 = (6P_1 + 3P_2)mod26$$

$$C_2 = (7P_1 + 6P_2)mod26$$