Algebra 2, Spring Semester Exam Review

1. (1 point) Let \( f(x) = 4x + 5 \) and \( g(x) = 7x - 3 \). Find \( f(x) + g(x) \).
   a. \( 11x + 2 \)   b. \( 11x + 8 \)   c. \( -3x + 8 \)   d. \( -3x + 2 \)

2. (1 point) Let \( f(x) = 6x + 3 \) and \( g(x) = 7x + 5 \). Find \( f(x) - g(x) \).
   a. \( -x + 8 \)   b. \( -x - 2 \)   c. \( 13x - 2 \)   d. \( 13x + 8 \)

3. (1 point) Let \( f(x) = 5x - 3 \) and \( g(x) = 4x + 7 \). Find \( f \cdot g \) and its domain.
   a. \( 20x^2 + 23x - 21 \); all real numbers except \( x = \frac{-7}{4} \)
   b. \( -15x^2 + 47x + 28 \); all real numbers except \( x = \frac{3}{5} \)
   c. \( -15x^2 + 47x + 28 \); all real numbers
   d. \( 20x^2 + 23x - 21 \); all real numbers

4. (1 point) Let \( f(x) = 3x - 6 \) and \( g(x) = x - 2 \). Find \( \frac{f}{g} \) and its domain.
   a. 3; all real numbers
   b. 3; all real numbers except \( x = 2 \)
   c. 1; all real numbers
   d. \( -3 \); all real numbers except \( x = 3 \)

5. (1 point) Let \( f(x) = 3x - 2 \) and \( g(x) = -4x + 6 \). Find \( (f \circ g)(4) \) or \( f(g(4)) \).
   a. \( -34 \)   b. \( -32 \)   c. 10   d. \( -10 \)
6. (1 point)
Graph the relation and its inverse. Use open circles to graph the points of the inverse.

<table>
<thead>
<tr>
<th>x</th>
<th>-4</th>
<th>-3</th>
<th>0</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>6</td>
<td>-3</td>
<td>1</td>
<td>-5</td>
</tr>
</tbody>
</table>

   a.

   b.

   c.

   d.

7. (1 point)
Is relation \( t \) a function? Is the inverse of relations \( t \) a function?

Relation \( t \)

<table>
<thead>
<tr>
<th>x</th>
<th>0</th>
<th>2</th>
<th>4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>y</td>
<td>-6</td>
<td>-4</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

   a. Relation \( t \) is not a function. The inverse of relation \( t \) is not a function.
   b. Relation \( t \) is not a function. The inverse of relation \( t \) is a function.
   c. Relation \( t \) is a function. The inverse of relation \( t \) is a function.
   d. Relation \( t \) is a function. The inverse of relation \( t \) is not a function.
What is the inverse of the given relation?

8. (1 point)
y = 2x - 4
a. y = \frac{1}{2}x + 2  
   c. y = 2x + 2
b. y = \frac{1}{2}x - 2  
   d. y = 2x - 2

9. (1 point)
An initial population of 340 quail increases at an annual rate of 28%. Write an exponential function to model the quail population. What will the approximate population be after 2 years?

a. f(x) = (340 \cdot 0.28)^x; 9,063  
   c. f(x) = 340(28)^x; 266,560
b. f(x) = 340(1.28)^x; 557  
   d. f(x) = 340(0.28)^x; 557

10. (1 point)
Suppose you invest $1900 at an annual interest rate of 5.2% compounded continuously. How much will you have in the account after 7.5 years?

a. $2,014.25  
   b. $15,010.60  
   c. $23,968.89  
   d. $2,806.26

Write the equation in logarithmic form.

11. (1 point)
5^4 = 625

a. \log_4 625 = 5  
   c. \log 625 = 4 \cdot 5
b. \log 625 = 4  
   d. \log_5 625 = 4

Evaluate the logarithm.

12. (1 point)
\log_2 16

a. 2  
   b. -4  
   c. 3  
   d. 4

Write the expression as a single logarithm.

13. (1 point)
4 \log x - 6 \log (x + 2)

a. 24 \log \frac{x}{x + 2}  
   c. \log x(x + 2)^{24}
b. \log x^4(x + 2)^6  
   d. \log \frac{x^4}{(x+2)^6}

Expand the logarithmic expression.

14. (1 point)
\log_3 2k^2

a. \log_3 2 \cdot 2 \log_3 k  
   c. \log_3 2 - 2 \log_3 k
b. \log_3 2 + 2 \log_3 k  
   d. 2 \log_3 k^2
____ 15. (1 point)
The pH of a liquid is a measure of how acidic or basic it is. The concentration of hydrogen ions in a liquid is labeled $\left[H^+\right]$. Use the formula $\text{pH} = -\log\left[H^+\right]$ to find the pH level, to the nearest tenth, of a liquid with $[H^+]$ about $1.6 \times 10^{-13}$.

a. $-13.2$  
   b. $13.0$  
   c. $13.2$  
   d. $12.8$

____ 16. (1 point)
Use the Change of Base Formula to evaluate $\log_2 9$.

a. $0.954$  
   b. $2.197$  
   c. $3.170$  
   d. $0.362$

Solve the exponential equation.

____ 17. (1 point)
$4^{5x} = 8$

a. $2$  
   b. $\frac{10}{3}$  
   c. $\frac{7}{10}$  
   d. $\frac{3}{10}$

Solve the logarithmic equation. Round to the nearest ten-thousandth if necessary.

____ 18. (1 point)
Solve $\log(6x + 10) = 2$.

a. $15$  
   b. $\frac{50}{3}$  
   c. $90$  
   d. $\frac{-4}{3}$

____ 19. (1 point)
Solve $\log 2x + \log 13 = 0$. Round to the nearest hundredth if necessary.

a. $6.5$  
   b. $0.04$  
   c. $26$  
   d. $0.15$

____ 20. (1 point)
Solve $\ln(2x + 7) = 5$. Round to the nearest thousandth.

a. $144.913$  
   b. $70.707$  
   c. $77.707$  
   d. $155.413$

Use natural logarithms to solve the equation. Round to the nearest thousandth.

____ 21. (1 point)
$6e^{4x} - 2 = 27$

a. $0.357$  
   b. $0.876$  
   c. $0.394$  
   d. $0.140$

____ 22. (1 point)
Write a recursive formula for the sequence $5, 10, 15, 20, 25, ...$ Then find the next term.

a. $a_n = a_{n-1} + 5$, where $a_1 = 30; 5$
   
   b. $a_n = a_{n-1} + 5$, where $a_1 = 5; 30$

   c. $a_n = a_{n-1} - 5$, where $a_1 = 5; 30$
   
   d. $a_n = a_{n-1} - 5$, where $a_1 = 5; -20$
23. (1 point)
Write an explicit formula for the sequence 6, 5, 4, 3, 2, ... Then find $a_{14}$.

a. $a_n = -n + 6; -7$

b. $a_n = -n + 6; -8$

c. $a_n = -n + 7; -6$

d. $a_n = -n + 7; -7$

24. (1 point)
Suppose you drop a tennis ball from a height of 8 feet. After the ball hits the floor, it rebounds to 85% of its previous height. How high will the ball rebound after its third bounce? Round to the nearest tenth.

a. 5.8 feet  
b. 1 foot  
c. 4.2 feet  
d. 4.9 feet

Is the sequence arithmetic? If so, identify the common difference.

25. (1 point)
11, 18, 25, 32, ...

a. yes; 7  
b. yes; 11  
c. yes; -7  
d. no

Is the sequence geometric? If so, identify the common ratio.

26. (1 point)
5, 25, 125, 625, ...

a. yes; 5  
b. yes; 10  
c. yes; -5  
d. no

Write the explicit formula for the geometric sequence. Then find the fifth term in the sequence.

27. (1 point)

$a_1 = -4, a_2 = 20, a_3 = -100$

a. $a_n = -4 \cdot (-4)^{n-1}; -1280$

b. $a_n = -4 \cdot (5)^n; -2500$

c. $a_n = -4 \cdot (-5)^{n-1}; -2500$

d. $a_n = -4 \cdot (-5)^n; 12500$

What is the sum of the finite arithmetic series?

28. (1 point)

16 + 20 + 24 + 28 + 32 + ... + 56

a. 396  
b. 176  
c. 380  
d. 340

29. (1 point)

Evaluate the series $\sum_{n=1}^{7} (n + 4)$.

a. 56  
b. 0  
c. 28  
d. 30

30. (1 point)

What is $S_5$ for 1000 + 500 + 250 + ...?

a. 968.75  
b. 1062.5  
c. 1937.5  
d. 12,500
31. (1 point)
Find the radian measure of an angle of 290°.
   a. \( \frac{18}{29\pi} \)  
   b. \( \frac{29\pi}{18} \)  
   c. \( \frac{18\pi}{29} \)  
   d. \( \frac{29\pi}{18} \)

32. (1 point)
Find the degree measure of an angle of \( \frac{6\pi}{5} \) radians.
   a. \( \frac{\pi}{150} \)  
   b. 216°  
   c. 216πº  
   d. 3.77°

33. (1 point)
Use the unit circle to find the exact value of \( \sin \left( -\frac{\pi}{2} \right) \). (If you use a calculator, you must be in radian mode!)
   a. \( -\frac{\sqrt{3}}{2} \)  
   b. \( -\frac{1}{2} \)  
   c. -1  
   d. \( -\frac{\sqrt{2}}{2} \)

34. (1 point)
Evaluate \( \cot \frac{\pi}{4} \). The angle is given in radians.
   a. 1  
   b. -1  
   c. 0  
   d. undefined

35. (1 point)
Use the unit circle to find the exact values of \( \cos 150° \) and \( \sin 150° \). (If you use a calculator, you must be in degree mode!)
   a. \( \cos = \frac{\sqrt{3}}{2}, \sin = \frac{1}{2} \)  
   b. \( \cos = \frac{1}{2}, \sin = -\frac{\sqrt{3}}{2} \)  
   c. \( \cos = -\frac{\sqrt{3}}{2}, \sin = \frac{1}{2} \)  
   d. \( \cos = -\frac{1}{2}, \sin = \frac{\sqrt{3}}{2} \)

36. (1 point)
\[ \cos^{-1} \left( \frac{\sqrt{3}}{2} \right) \] (At what angle measure is the value of cosine equal to \( \frac{\sqrt{3}}{2} \)?)
   a. 60°  
   b. 30°  
   c. 240°  
   d. 150°
Use the given graph. Determine the period of the function.

37. (1 point)

Find the amplitude of the sine curve shown below.

38. (1 point)
39. (1 point)
The graph below shows height as a function of time for a ride on a Ferris wheel. Find a sine equation for the graph.

\[ y = 25 \sin \left( \frac{\pi}{4} (x - 4) \right) + 30 \]

b. \[ y = 25 \sin \left( \frac{\pi}{4} (x - 2) \right) + 30 \]  
c. \[ y = 30 \sin \left( \frac{\pi}{4} (x - 2) \right) + 25 \]

d. \[ y = 30 \sin \left( \frac{\pi}{4} (x - 4) \right) + 25 \]

40. (1 point)
The line of sight from a small boat to the light at the top of a 55-foot lighthouse built on a cliff 30 feet above the water makes a 17° angle with the water. To the nearest foot, how far is the boat from the cliff? (Your calculator should be in degree mode for all of the following triangle problems!)

\[ \text{Drawing is not to scale.} \]

a. 290 feet  
b. 278 feet  
c. 25 feet  
d. 179 feet
Sketch the angle in standard position.

_____ 41. (1 point)
\[ -150^\circ \]

a. 

Use the given circle. Find the length $s$ to the nearest tenth.

_____ 42. (1 point)

a. 10.5 in.  

b. 5.2 in.  

c. 3.3 in.  

d. 20.9 in.
43. (1 point)

\[ y = \cos x; \] translated 6 units left would result in the equation

a. \[ y = \cos (x + 6) \hspace{1cm} \text{c.} \hspace{0.2cm} y = \cos x + 6 \]
b. \[ y = \cos x - 6 \hspace{1cm} \text{d.} \hspace{0.2cm} y = \cos (x - 6) \]

Use the Law of Sines to find the missing side of the triangle.

44. (1 point)

Find the measure of \( b \), given \( m \angle A = 18^\circ \), \( m \angle B = 54^\circ \), and \( a = 70 \).

a. 183.3 \hspace{1cm} b. 59.5 \hspace{1cm} c. 26.7 \hspace{1cm} d. 17.5

Use the Law of Cosines to find the missing angle.

45. (1 point)

Find \( m \angle B \), given \( a = 11 \), \( b = 12 \), and \( c = 17 \).

a. \( m \angle B = 49.9^\circ \)
b. \( m \angle B = 40.1^\circ \)
c. \( m \angle B = 45.3^\circ \)
d. \( m \angle B = 44.7^\circ \)

46. (1 point)

Identify the focus and the directrix of the graph of \( x = -\frac{1}{20} y^2 \).

a. focus \((0, -5)\), directrix \( x = 5 \)
b. focus \((-5, 0)\), directrix \( x = -5 \)
c. focus \((0, -5)\), directrix \( x = -5 \)
d. focus \((-5, 0)\), directrix \( x = 5 \)

Write an equation of a circle with the given center and radius.

47. (1 point)

Center \((-7, -6)\) and radius 2

a. \( (x + 7)^2 + (y + 6)^2 = 4 \)
b. \( (x - 7)^2 + (y - 6)^2 = 2 \)
c. \( (x + 7)^2 + (y + 6)^2 = 2 \)
d. \( (x - 7)^2 + (y - 6)^2 = 4 \)

Write an equation of an ellipse in standard form with the center at the origin and with the given characteristics.

48. (1 point)

Vertex at \((-5, 0)\) and co-vertex at \((0, 4)\)

a. \( \frac{x^2}{4} + \frac{y^2}{5} = 1 \)
b. \( \frac{x^2}{25} + \frac{y^2}{16} = 1 \)
c. \( \frac{x^2}{16} + \frac{y^2}{25} = 1 \)
d. \( \frac{x^2}{5} + \frac{y^2}{4} = 1 \)
49. (1 point)

An elliptical track has a major axis that is 32 yards long and a minor axis that is 24 yards long. Find an equation for the track if its center is (0, 0) and the major axis is the x-axis.

a. \[ \frac{x^2}{32} + \frac{y^2}{24} = 1 \]
b. \[ \frac{x^2}{24} + \frac{y^2}{32} = 1 \]
c. \[ \frac{x^2}{144} + \frac{y^2}{256} = 1 \]
d. \[ \frac{x^2}{256} + \frac{y^2}{144} = 1 \]
Algebra 2, Spring Semester Exam Review
Answer Section

1. ANS: A    PTS: 1
2. ANS: B    PTS: 1
3. ANS: D    PTS: 1
4. ANS: B    PTS: 1
5. ANS: B    PTS: 1
6. ANS: A    PTS: 1
7. ANS: C    PTS: 1
8. ANS: A    PTS: 1
9. ANS: B    PTS: 1
10. ANS: D   PTS: 1
11. ANS: D   PTS: 1
12. ANS: D   PTS: 1
13. ANS: D   PTS: 1
14. ANS: B   PTS: 1
15. ANS: D   PTS: 1
16. ANS: C   PTS: 1
17. ANS: D   PTS: 1
18. ANS: A   PTS: 1
19. ANS: B   PTS: 1
20. ANS: B   PTS: 1
21. ANS: C   PTS: 1
22. ANS: B   PTS: 1
23. ANS: D   PTS: 1
24. ANS: D   PTS: 1
25. ANS: A   PTS: 1
26. ANS: A   PTS: 1
27. ANS: C   PTS: 1
28. ANS: A   PTS: 1
29. ANS: A   PTS: 1
30. ANS: C   PTS: 1
31. ANS: D   PTS: 1
32. ANS: B   PTS: 1
33. ANS: C   PTS: 1
34. ANS: A   PTS: 1
35. ANS: C   PTS: 1
36. ANS: B   PTS: 1
37. ANS: A   PTS: 1
38. ANS: A   PTS: 1
39. ANS: B   PTS: 1
40. ANS: B   PTS: 1
41. ANS: B   PTS: 1
42. ANS: A   PTS: 1
43. ANS: A  PTS: 1
44. ANS: A  PTS: 1
45. ANS: D  PTS: 1
46. ANS: D  PTS: 1
47. ANS: A  PTS: 1
48. ANS: B  PTS: 1
49. ANS: D  PTS: 1