Pre-Calculus: Fall Semester

Name _____

Final Exam Review

Per/Sec. _____ Date _____

1. In *slope-intercept* form, what is the equation of the line passing through $(15, 11)$ and perpendicular to the line joining $(9, 6)$ and $(3, 16)$?

2. In *slope-intercept* form, what is the equation of the line passing through $(6, 22)$ and parallel to the line joining $(11, 3)$ and $(2, 6)$?

Solve.

3. $\left|3 + \frac{4}{5}x\right| \leq 5$

4. $|3x - 1| > 2$

5. Find the domain of $y = \dfrac{1}{x+2}$.

6. Find the domain of $f(x) = \sqrt{2x+3}$.

Find the inverse. Is it a function?

7. $q(x) = \dfrac{1+x}{7-x}$

Find the inverse. Is it a function?

8. $f(x) = \dfrac{4}{x-1} + 10$

Given $f(x) = 2x + 5$, $g(x) = x^2 - 10$ and $h(x) = 3x - 8$, find the following.

9. $g(h(x))$

10. $g(f(n))$

Factor completely.

11. $(4x-15)^2-10(4x-15)+16$

12. $(5x-9)^2-7(5x-9)-8$

Factor.

13. $27-64y^3$

14. $125c^3-w^3$

Simplify.

15. $\dfrac{5}{b^2-16}+\dfrac{3}{4-b}+\dfrac{7}{b+4}$

16. $\dfrac{3}{x+3}-\dfrac{4}{5-x}+\dfrac{6}{x^2-2x-15}$

17. $\dfrac{2w^2+9w+4}{16-w^2}\div\dfrac{2w^2+w}{w^2-w-12}$

18. $\dfrac{y^4-13y^2+36}{y^2-4}\div\dfrac{y^2-5y+6}{y^2-3y+2}$

19. $\dfrac{1-\frac{5}{y}+\frac{6}{y^2}}{1-\frac{4}{y^2}}$

20. $\dfrac{\frac{3}{c^2-9}+\frac{2}{c+3}}{\frac{4}{c+3}+\frac{2}{c-3}}$

Solve and graph.

21. $x^3-3x^2-4x+12\leq 0$

22. $x^3+x^2-16x-16>0$

Simplify.

23. $\dfrac{\left(x^4y\right)^{-\frac{1}{2}}}{(x^2y^{-6})^{\frac{1}{2}}}$

24. $\dfrac{(2x^2y^{-1})^3(x^5)}{(2+x^0)^2\,(3^{-2})\,(x^2)}$

25. $5\sqrt[3]{16}+2\sqrt[3]{54}$

26. $6\sqrt{54}-3\sqrt{24}-8\sqrt{96}$

Simplify.

27. $\dfrac{4^{-1}+2^{-2}}{4^{-2}+2^{-4}}$

28. $\left(\dfrac{2^{-2}+4^{-1}}{5^{-1}}\right)^{-2}$

Solve.

29. $\dfrac{10x}{x+2}=\dfrac{2x^2-3}{x^2-4}+\dfrac{2x-3}{x-2}$

30. $\dfrac{2x-24}{x^2-8x+12}=\dfrac{3x}{x-6}+\dfrac{5}{x-2}$

31. Solve: $\sqrt{7x-3}+3=2x$

32. Solve: $\sqrt{x-2}-x=-8$

Solve.

33. $125^{x+1} = 25^{3x-1}$

34. $\frac{1}{4} = 64^{2x-1}$

35. Simplify: $\dfrac{\sqrt{5}-4}{2+\sqrt{5}}$

36. Rationalize the denominator: $\dfrac{\sqrt{5}+\sqrt{3}}{\sqrt{5}-\sqrt{3}}$

37. Solve for x if $(3x-5)^{\frac{3}{2}} = 8^{\frac{3}{2}}$.

38. Solve for x if $(2x-3)^{\frac{4}{3}} = 64^{\frac{2}{3}}$.

Given $f(x) = 2x+5$, $g(x) = x^2 - 10$ and $h(x) = 3x - 8$, find the following.

39. $h(f(-6))$

40. $g(h(f(0)))$

Graph.

41. $p(x) = \dfrac{3}{x-1}$

42. $h(x) = \dfrac{4}{x+2}$

43. Find the value of x if $\log_x 18 = 2$.

44. Solve for x: $\log_{3x} 81 = 2$

45. Evaluate: $\log_4 \dfrac{1}{\sqrt{32}}$

46. Evaluate: $\log_5 25\sqrt{5}$

47. Evaluate: $\log_3 \sqrt[3]{9}$

48. Find all value(s) for x such that $\ln(3x+1) + \ln x = \ln 2$.

49. Solve for x: $\ln(3x+2) - \ln x = 4$

50. Solve: $\log_2(\log_3 x) = 2$

51. What is the value of x if $\log_3(\log_8(\log_4 x)) = -1$?

52. Which equation below is equivalent to $x \log 3 + 7 \log 3 = 3 \log 5$?

a) $(x+7)^3 = 125$ b) $3^{7x} = 5^3$

c) $37 = 5^3$ d) $3^{x+7} = 5^3$

e) $3x + 21 = 15$

Write as the sum or difference of logarithms with no exponents.

53. $\log\left(\sqrt[5]{\dfrac{b^2c}{d^4}}\right)$

54. $\log_c \sqrt[3]{\dfrac{x^4}{y^3z^2}}$

55. Express as a logarithm of a single expression $3\log_3 A - \frac{1}{3}\log_3 B$.

Solve.

56. $\log_6(y+4)+\log_6(3y)=2$

57. $2=\log_4(2x)+\log_4(x-2)$

Divide.

58. $(p^4+5p^3+p^2+20p-12)\div(p^2+4)$

59. $(2c^4-6c^3-25c^2+48c+72)\div(c^2-8)$

60. If $y=-\frac{1}{3}x^2-2x+\frac{2}{3}$ is put in the form $y=a(x-h)^2+k$, then what is the value of h?

61. If $4y=-x^2-2x+7$ is put in the form $y=a(x-h)^2+k$, then what is the value of k?

Factor.

62. $x^3-5x^2-4x+20$.

63. $x^3-19x-30$.

64. If -5 is a root of $g(x)=3x^3+8x^2-33x+10$, find all other roots.

65. If $-\frac{1}{3}$ is a root of $h(x)=3x^3-2x^2-61x-20$, find all other roots.

Find all roots.

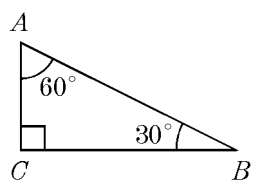
66. $x^3-\frac{1}{4}x^2-\frac{7}{8}x+\frac{3}{8}=0$

67. $x^3-\frac{7}{6}x^2-\frac{1}{6}x+\frac{1}{3}=0$

68. Find a polynomial equation with roots of 3 and -2 (double root).

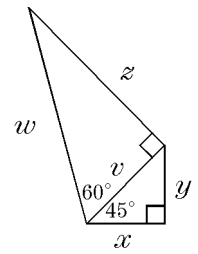
69. Find a polynomial equation that has integral coefficients and the numbers 1, -2, -3 as roots.

70. If $BC = 24$, find AC.

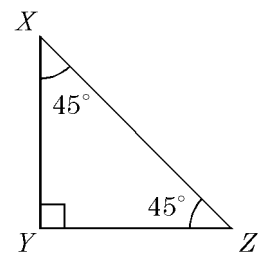


71. If $BC = 2$, find AC.

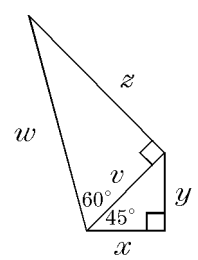
72. In the given figure, if $z = 6$, find the value of y.



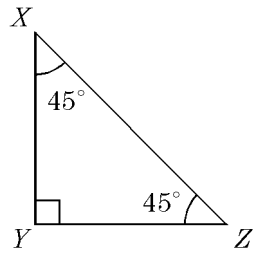
73. If $XY = 3\sqrt{2}$, find XZ.



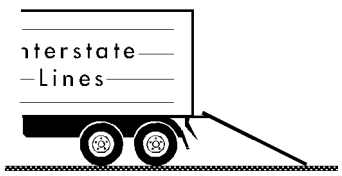
74. In the given figure, if $z = 4\sqrt{3}$, find the value of y.



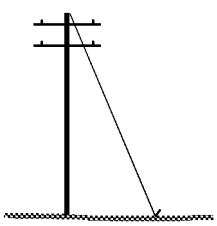
75. If $XY = 7$, find XZ.



76. One end of a ramp is raised to the back of a truck 1 metre above the ground. If the length of the ramp is 2 metres, what is the measure of the angle the ramp makes with the ground?



77. A $6\sqrt{2}$ metre long wire is attached to the top of a telephone pole 6 metres tall. What is the exact measure of the angle the wire makes with the ground?



Name the coterminal angle of the given angle.

78. 700°

79. 495°

80. What is the reference angle of 223°?

81. What is the reference angle of -820°?

82. Determine the *exact* value of $\cos\theta$ if $(3, -2)$ is a point on the terminal side.

83. If the point $(3, -5)$ is on the terminal arm of angle $\mathbf{P}$, what is the value of $\sin \mathbf{P}$?

84. If $\sin\theta > 0$ and $\tan\theta < 0$ then in which quadrant does θ terminate?

85. If $\cos\theta > 0$ and $\tan\theta > 0$ then in which quadrant does θ terminate?

86. If $\sin\theta = \frac{2}{5}$ and $\tan\theta > 0$, then what is the $\cos\theta$ expressed as an exact value?

87. If $\cos\theta = -\frac{3}{4}$ and $\sin\theta < 0$, then what is the $\tan\theta$ expressed as an exact value?

88. What is the reference angle of $\frac{14\pi}{3}$?

89. What is the reference angle of $\frac{11\pi}{6}$?

Solve.

90. $\csc x = \sqrt{2}$

91. $\sec x = 2$

92. If the point $P(2, -3)$ is a point on the terminal side of angle θ in standard position, then what is the exact value of $\sec\theta$?

93. If the point $P(-4, 1)$ is a point on the terminal side of angle θ in standard position, then what is the exact value of $\csc\theta$?

94. If the point $P(0, -1)$ is a point on the terminal side of angle θ an angle in standard position. What is the exact value of $\cot\theta$?

95. If the point $P(-1, 0)$ is a point on the terminal side of angle θ an angle in standard position. What is the exact value of $\csc\theta$?

Simplify.

96. $\cos^2\theta + \sin^2\theta + \cot^2\theta$

97. $\cos\theta\sec\theta - \dfrac{\cos\theta}{\sec\theta}$

Verify each identity.

98. $\dfrac{1+\tan\theta}{\sin\theta} = \csc\theta + \sec\theta$

99. Simplify: $\dfrac{1+\tan\theta}{\sec\theta}$

100. $\dfrac{\cos\theta}{1-\cos^2\theta} = \csc\theta\cot\theta$

101. $\dfrac{\cos\theta}{1-\sin^2\theta} = \sec\theta$

Find each trig. value to the nearest thousandth.

102. $\csc 330^\circ$

103. $\cot 135^\circ$

104. $\sec\frac{7\pi}{3}$

105. $\csc\frac{4\pi}{3}$

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Answer List

1. $y = \frac{3}{5}x + 2$
2. $y = -\frac{1}{3}x + 24$
3. $\left[-10, \frac{5}{2}\right]$
4. $\left(-\infty, -\frac{1}{3}\right),\ \left(1, \infty\right)$
5. $(-\infty, -2),\ (-2, \infty)$
6. $\left[-\frac{3}{2}, \infty\right)$
7.
8. $\frac{x-6}{x-10}$; yes
9. $9x^2 - 48x + 54$
10. $4n^2 + 20n + 15$
11. (4x-17)(4x-23)
12. $(5x - 17)(5x - 8)$
13. $(3 - 4y)(9 + 12y + 16y^2)$
14. $(5c - w)(25c^2 + 5cw + w^2)$
15. $\frac{4b-35}{(b-4)(b+4)}$
16. $\frac{7x+3}{(x+3)(x-5)}$
17. $-\frac{w+3}{w}$
18. $(y + 3)(y - 1)$
19. $\frac{y-3}{y+2}$
20. $\frac{2c-3}{6c-6}$
21. $(-\infty, -2] \cup [2,3]$
22. $(-4, -1) \cup (4,\infty)$
23. $x^{-3}y^{\frac{5}{2}}$
24. $\dfrac{8x^9}{y^3}$
25. $16\sqrt[3]{2}$
26. $-20\sqrt{6}$
27. 4
28. $\frac{4}{25}$
29. $\frac{1}{2}, 3$
30. -1
31. 4
32. 11
33. $x = \frac{5}{3}$
34. $x = \frac{1}{3}$
35. $13 - 6\sqrt{5}$
36. $4 + \sqrt{15}$
37. $\dfrac{13}{3}$
38. 5.5 or -2.5
39. -29
40. 39
41.
42.
43. $3\sqrt{2}$
44. 3
45. $-\frac{5}{4}$
46. $\frac{5}{2}$
47. $\frac{2}{3}$
48. $\frac{2}{3}$ only
49. $\dfrac{2}{e^4 - 3}$
50. 81
51. 16
52. d
53. $\frac{2}{5}\log b + \frac{1}{5}\log c - \frac{4}{5}\log d$
54. $\frac{4}{3}\log_c x - \log_c y - \frac{2}{3}\log_c z$
55. $\log_3\left(\dfrac{A^3}{\sqrt[3]{B}}\right)$
56. $y = 2$
57. $x = 4$
58. $p^2 + 5p - 3$
59. $2c^2 - 6c - 9$
60. -3
61. 2
62. $(x - 5)(x + 2)(x + 2)$
63. $(x - 5)(x + 2)(x + 3)$
64. $2,\ \frac{1}{3}$
65. $-4,\ 5$
66. $-1,\ \frac{1}{2},\ \frac{3}{4}$
67. $1,\ \frac{2}{3},\ -\frac{1}{2}$
68. $x^3 + x^2 - 8x - 12 = 0$
69. $x^3 + 4x^2 + x - 6 = 0$
70. $8\sqrt{3}$
71. $\frac{2\sqrt{3}}{3}$
72. $\sqrt{6}$
73. 6
74. $2\sqrt{2}$
75. $7\sqrt{2}$
76. 30°
77. 45°
78. 340°
79. 135°
80. 43°
81. 80°
82. $\dfrac{3}{\sqrt{13}}$
83. $\dfrac{-5\sqrt{34}}{34}$
84. 2
85. 1
86. $\frac{\sqrt{21}}{5}$
87. $\frac{\sqrt{7}}{3}$

88. $\frac{\pi}{3}$
89. $\frac{\pi}{6}$
90. $\frac{\pi}{4}$
91. $\frac{\pi}{3}$
92. $\frac{\sqrt{13}}{2}$
93. $\sqrt{17}$
94. 0
95. undefined
96. $\csc^2\theta$
97. $\sin^2\theta$
98.
99. $\sin\theta + \cos\theta$
100.
101.
102. -2
103. -1
104. 2
105. $-\frac{2\sqrt{3}}{3}$

Catalog List

1. CM2 DJ 50
2. CM2 DJ 56
3.
4.
5.
6. APC BA 11
7.
8. TRI HC 64
9. TRI HB 34
10. TRI HB 37
11.
12.
13. TRI AD 87
14. TRI AD 92
15. TRI AE 201
16. TRI AE 202
17. ALG LG 106
18. ALG LG 88
19. ALG LJ 109
20. ALG LJ 126
21.
22.
23.
24.
25.
26.
27. ALG BG 78
28. ALG BG 80
29. ALG LL 79
30. ALG LL 82
31. CM1 CF 14
32. CM1 CF 41
33. TRI KF 32
34. TRI KF 36
35. CM1 BD 16
36. CM1 BD 17
37. CM1 CG 29
38. CM1 CG 33
39. TRI HB 10
40. TRI HB 13
41. TRI IF 5
42. TRI IF 6
43. CM1 OA 48
44. CM1 OA 54
45. CM1 OA 60
46. CM1 OA 58
47. CM1 OA 62
48. APC AD 18
49. APC AD 20
50. CM1 OD 112
51. CM1 OD 34
52. CM1 OD 44
53. TRI KC 84
54. TRI KC 85
55. CM1 OC 80
56. TRI KF 137
57. TRI KF 138
58. ALG EI 45
59. ALG EI 48
60. CM1 FC 10
61. CM1 FC 16
62.
63.
64. TRI GI 136
65. TRI GI 135
66. TRI GH 63
67. TRI GH 64
68. CM1 PD 60
69. CM1 PD 62
70. TRI MI 23
71. TRI MI 27
72. MMA LJ 12
73. TRI MI 62
74. MMA LJ 10
75. TRI MI 58
76. CM2 JC 93
77. CM2 JC 97
78. TRI NE 32
79. TRI NE 27
80. CM1 GA 15
81. CM1 GA 17
82. CM1 GB 2
83. CM1 GB 7
84. CM1 GB 36
85. CM1 GB 39
86. CM1 GC 23
87. CM1 GC 25
88. CM1 IA 33
89. CM1 IA 34
90. TRI OG 37
91. TRI OG 47
92. CM1 IB 61
93. CM1 IB 62
94. CM1 IB 41
95.
96. TRI QA 50
97. TRI QA 57
98. TRI QC 67
99. CM1 IH 52
100. TRI QC 48
101. TRI QC 20
102. TRI OF 94
103. TRI OF 42
104. TRI OF 227
105. TRI OF 190