

Pre-Calculus CCA Review

1. Write the equation for the transformation of $y = \sqrt{x}$ by reflecting about the x-axis and stretching horizontally by a factor of 2.

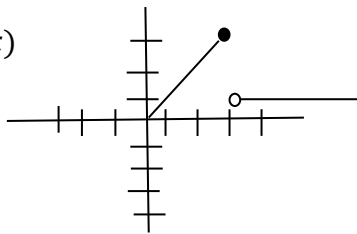
2. Convert $\frac{4\pi}{3}$ to degrees.

3. Convert -300° to radians.

4. Convert $\left(-2, -\frac{2\pi}{3}\right)$ from polar to rectangular coordinates.

5. Convert $(-2\sqrt{2}, 2\sqrt{2})$ from rectangular to polar coordinates.

6. Find the $\lim_{x \rightarrow 3} f(x)$



7. Locate the maximum and minimum for the function $f(x) = 2x^3 - 3x^2 - 8x + 10$.

8. Find the real solutions of $f(x) = 2x^4 + x^3 - 17x^2 - 4x + 6$

9. Determine the concavity of $f(x) = \cos(x - 1)$ on the interval $[0, 2\pi)$.

10. On which interval(s) is $g(x) = |x + 2| + |x - 1| - 2$ increasing and on which interval(s) is the function decreasing?

11. Where are the discontinuities in the equation $= \frac{2x^2 + x - 1}{x - 2}$?

12. State whether each of the following equations are even, odd, or neither.

(a) $f(x) = 2\tan x$ (b) $f(x) = |x|$ (c) $h(x) = 3x^3 + 5$ (d) $k(x) = 4x^2 + x$ (e) $r(x) = \sin x$

13. Write the inverse of $y = 2^x$.

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14. Given $f(x) = (x + 1)^4$, $x \geq -1$, then $f^{-1}(x) = ?$

15. Find the inverse of $f(x) = e^{2x}$.

16. Solve for x. $3^{x-2} = 2^x$

17. Solve for x. $3 + 2 \log x = 6$

18. Solve for x. $\log_3(x + 2) + \log_3(x - 1) = 4$

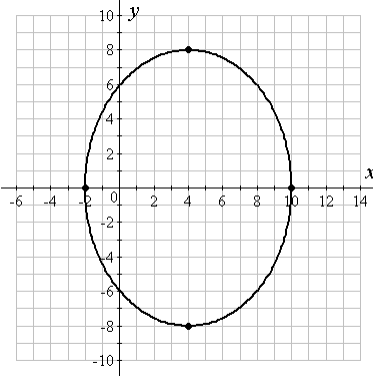
19. Given $8 \cdot 4^{3+x} = 16 \cdot 8^{2+x}$, Find the value of $x + 3$.

20. The population P of a city is given by $P = 201,000e^{0.018t}$ where $t = 0$ represents 1960. According to this model, when will the population reach 350,000?

21. Fred has \$500 to invest at 6% annual interest compounded monthly. How long will it take for his investment to grow to \$1500?

22. Graph $\frac{x^2}{16} - \frac{y^2}{25} = 1$.

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23. Write the equation for this ellipse in standard form.

24. Find the line of best fit and determine the most effective dosage for a person weighing 150 pounds.

Body Weight	Drug Dosage (mg)
80	5
100	6
120	8
140	10
160	12
200	15

25. The following data represents the average monthly rainfall for a city. Use a graphing utility to find a sinusoidal equation that models this data.

Month, x	Rainfall (inches)
Jan, 1	6.2
Feb, 2	8.1
Mar, 3	9.2
Apr, 4	12.5
May, 5	15.2
June, 6	12.3
July, 7	10.1
Aug, 8	9.2
Sept, 9	8.2
Oct, 10	6.1
Nov, 11	4.8
Dec, 12	4.9

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26. Which of the following series converges?
- A) $9 + 6 + 3 + 0 + \dots$ B) $3 + 6 + 12 + 24 + \dots$ C) $99 + 33 + 11 + 11/3 + \dots$
- D) $400 + 200 + 100 + 50 + \dots$
27. Find the series represented by $\sum_{-2}^5 2x - 1$.
28. Find the recursive and explicit formulas for the n th term if $u_1 = 3, r = 2$.
29. Find the sum of $3 + 6 + 12 + \dots + 192$.
30. Given a triangle with $a = 40, b = 82,$ and $c = 68,$ find C .
31. In triangle $ABC, A = 80^\circ, a = 60,$ and $c = 65.$ How many triangles are possible?
32. In triangle $RST, R = 86.5^\circ, r = 14.2,$ and $s = 26.5.$ How many triangles are possible?
33. In triangle MNP with $M = 42^\circ, P = 105^\circ,$ and $m = 20,$ find p .
34. Solve $\triangle ABC$ if given $a = 16, b = 18, C = 75^\circ.$ Round your answer to the nearest tenth.
35. Given $\mathbf{u} = \langle -2, 6 \rangle, \mathbf{v} = \langle 5, -5 \rangle$ and $\mathbf{w} = \langle 3, -6 \rangle$ find vector \mathbf{x} if $\mathbf{x} = 2\mathbf{u} - 5\mathbf{v} + 3\mathbf{w}.$
36. A vector has magnitude of 5 and a direction angle $\theta = 120^\circ.$ Find its component form.

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37. A vector has its initial point $(8, -2)$ and its terminal point $(-2, 6)$. Find its component form.

38. Given $\mathbf{u} = 2\mathbf{i} - 3\mathbf{j}$, $\mathbf{v} = -\mathbf{i} + \mathbf{j}$, and $\mathbf{w} = 5\mathbf{i} + 8\mathbf{j}$, find $2\mathbf{u} + 3\mathbf{v} - 4\mathbf{w}$.

39. The magnitude of the vector with initial point $(3, -6)$ and terminal point $(8, 2)$ is _____.

40. Find the direction angle of the vector $\mathbf{v} = 5\mathbf{i} - 8\mathbf{j}$ rounded to the nearest degree.

41. If $\mathbf{w} = 3\mathbf{i} + 3\mathbf{j}$ and $\mathbf{v} = 4\mathbf{i} - 5\mathbf{j}$, find $\mathbf{w} \cdot \mathbf{v}$.

42. Determine whether each pair of vectors is orthogonal.

A) $\mathbf{v} = 3\mathbf{i} + 2\mathbf{j}$ $\mathbf{w} = 2\mathbf{i} + 3\mathbf{j}$ B) $\mathbf{v} = \frac{1}{2}\mathbf{i} + 5\mathbf{j}$ $\mathbf{w} = 10\mathbf{i} - \mathbf{j}$ C) $\mathbf{v} = 3\mathbf{i} + 4\mathbf{j}$ $\mathbf{w} = 2\mathbf{i} - 3\mathbf{j}$

43. Graph $y = -3 \sin(x + 3) - 1$

44. Graph $y = 3 \cos(x - 3) + 1$

45. Find all the zeroes of $y = \cos 2x$ on $[0, 2\pi)$.

46. Which trig. function has the greatest maximum y-value?

A) $y = 3\sin 2x - 1$ B) $y = -\cos 3x + 4$ C) $y = -5\sin 2x + 2$

47. State whether the following trig. functions are odd, even, or neither.

A) $\sin\theta$ B) $\cos\theta$ C) $\sec\theta$ D) $\csc\theta$ E) $\tan\theta$

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48. Find the exact value for $\arcsin(-1/2)$ in radians.

49. Simplify: $\cos(\sin^{-1}(-3/5))$

50. Simplify: $\cos(-\theta) \csc(-\theta)$.

51. Simplify: $(\sin x - \cos x)^2 - (\sin x + \cos x)^2$.

52. Find the sum of the solutions to the following equation if $0 \leq \theta \leq 360^\circ$,

$$2\cos^2\theta + \cos\theta - 1 = 0.$$

53. A bird is spotted by 2 ground observers who are 100 ft. apart and in line with the bird. They report the angles of elevation to the bird are 30° and 50° . How high is the bird?

54. A tower is 220 ft. tall. How long should a wire be if it is attached 8 ft. from the top of the tower and makes a 45° angle with the ground?

55. A wheel with a diameter of 40 inches makes one revolution every 30 seconds. How fast is it moving in ft/min?

56. A point on the edge of a 14 ft. diameter windmill is rotated through an angle of 160° . How far does the point move?

57. A ferris wheel makes 1 revolution every $1/8$ hour. If you are in a seat on the ferris wheel with radius 10 ft., how fast are you moving in ft/min.?

58. The second hand on a clock is 8 inches long. How far does the tip travel in 35 seconds?

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59. A 10 ft. tree stands at the top of a vertical cliff. A man finds that, to the nearest degree, the angle of elevation of the top and bottom of the tree is 36° and 32° respectively. How far is the bottom of the cliff from the man?

60. A ball is dropped from a height of 18 ft. On each bounce it rebounds to $\frac{1}{3}$ of its height. When the ball hits the ground for the 4th time, how far has it traveled?

61. Write the equation of the hyperbola with vertices (8, 6) and (8, 2) and foci (8, 7) and (8, 1).

62. Identify the vertices and asymptote equations for the following hyperbola:

$$\frac{(y - 4)^2}{25} - \frac{x^2}{16} = 1$$

63. Locate the absolute minimum of $f(x) = 3x^4 + 20x^3 + 18x^2 - 2x - 10$.

64. Determine the length of the major and minor axes of the ellipse:

$$9(x - 2)^2 + 27(y + 4)^2 = 243$$

65. Locate the zeros of the function $f(x) = 4x^4 + 4x^3 - 35x^2 - 36x - 9$.