

Pre-Calculus Exam Review

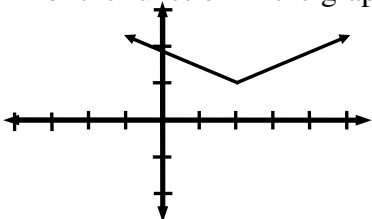
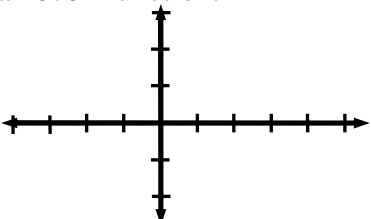
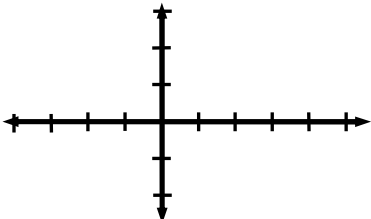
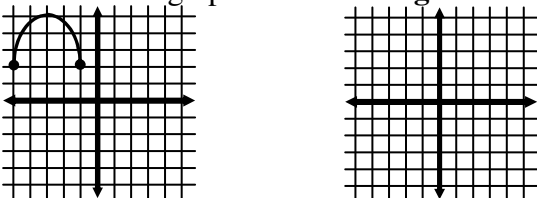
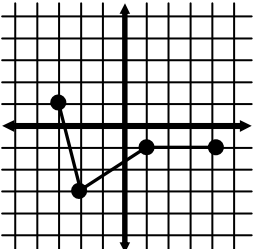
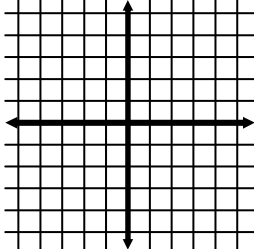
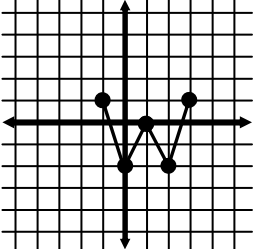
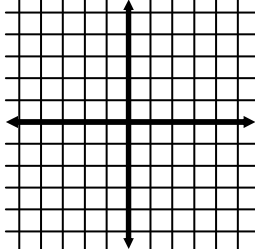
Semester 1 Exam

Functions (Chapters 1, 2, and 4)

For questions 1 – 6, let $f(x) = \frac{1}{x-5}$ and $g(x) = \frac{1}{x+1}$.

<p>1. What is $f + g$?</p>	<p>2. What is $f \cdot g$?</p>
<p>3. What is $f \circ g$?</p> <p>$D_{f \circ g}$: _____</p> <p>$R_{f \circ g}$: _____</p>	<p>4. What is $g \circ f$?</p> <p>$D_{g \circ f}$: _____</p> <p>$R_{g \circ f}$: _____</p>
<p>5. What is f^{-1}?</p>	<p>What is g^{-1}?</p>

Answer the questions about the graphs of functions.

<p>7. What is the domain for the function in the graph below?</p> 	<p>8. Sketch a graph of an even function.</p> 
<p>9. Sketch a graph of an odd function.</p> 	<p>10. Reflect the graph about the origin.</p> 
<p>11. Given the graph of $f(x)$ below, sketch the graph of $f(x) + 3$</p>  	<p>12. Given the graph of $g(x)$ below, sketch the graph of $2 \cdot g(x)$.</p>  

Find the domain and range for each function below.

13. $f(x) = \sqrt{3+x}$

Domain: _____

Range: _____

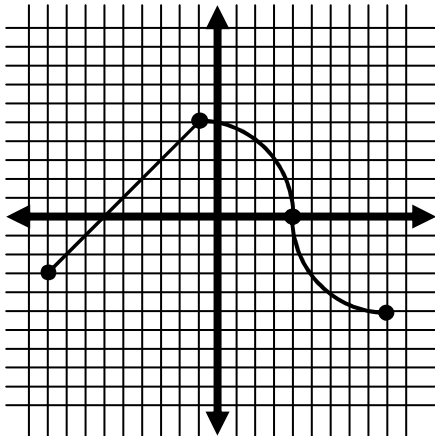
14. $g(x) = \frac{1}{x+8}$

Domain: _____

Range: _____

Questions 15 – 18: Analyze function $h(x)$ in the graph below. (1 point each)

$h(x)$



15. What is the value of $h(6)$?

16. For what value of x does $h(x) = 3$?

17. On what interval(s) is $h(x)$ decreasing?

18. On what interval(s) is $h(x) > 0$?

If $f(x) = \frac{x+2}{x-7}$ and $g(x) = \frac{3}{x}$, find an expression for each of the following operations.

19. $f + g$

20. $\frac{f}{g}$

If $f(x) = 2x^2 - 5x + 1$, find an expression for each of the following.

21. $f(x) + 3$

22. $f(x + 3)$

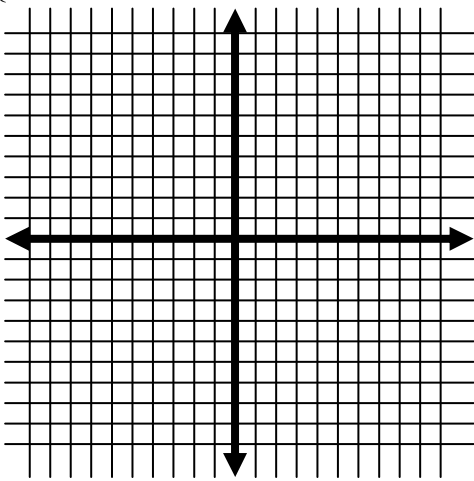
Trigonometric Functions (Chapter 5)

Evaluate.

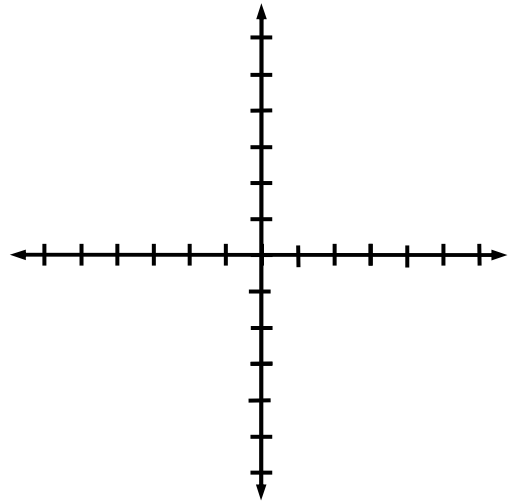
23. Convert $\frac{11\pi}{6}$ to degrees.	24. Convert 210° to radians.	25. What is the <i>exact</i> value of $\tan 120^\circ$?
26. What is the <i>exact</i> value of $\sec \frac{5\pi}{3}$?	27. In which quadrant is θ if $\csc \theta > 0$ and $\tan \theta < 0$?	28. What is the <i>exact</i> value of $\cos \theta$ if θ is in quadrant II and $\sin \theta = \frac{24}{25}$?
29. If $\cos \alpha = -\frac{1}{5}$ and $\tan \alpha > 0$, what is the exact value of $\sin \alpha$?	30. What is the value of $\tan \theta$ if $(-8, 3)$ is on the terminal side of θ in standard position?	31. Find a negative angle measures that is coterminal with 130° .
32. What is the reference angle of 245° in standard position?	33. What is the reference angle of $\frac{4\pi}{3}$ in standard position?	34. What is the period and phase shift of $f(x) = \sin(3x - \pi)$? Period: _____ Phase Shift: _____

Graph the functions below.

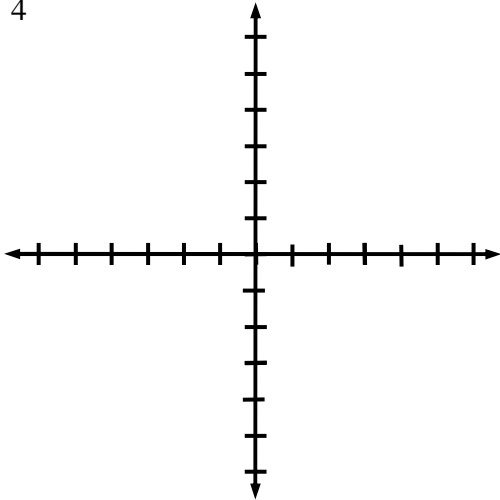
35. $f(x) = \begin{cases} 2x+3, & \text{if } x < 0 \\ \sqrt{x}, & \text{if } x \geq 0 \end{cases}$



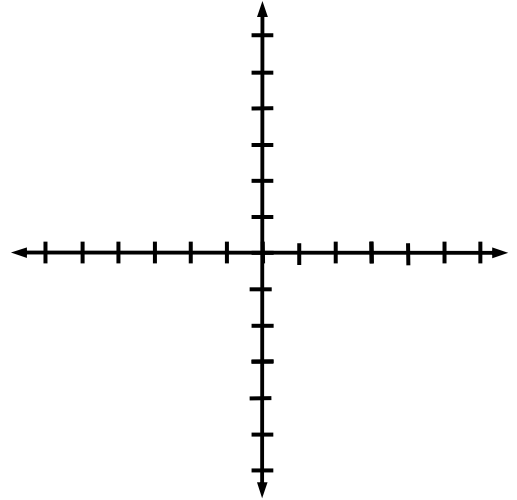
36. $y = 3 \cos(2x + \pi)$



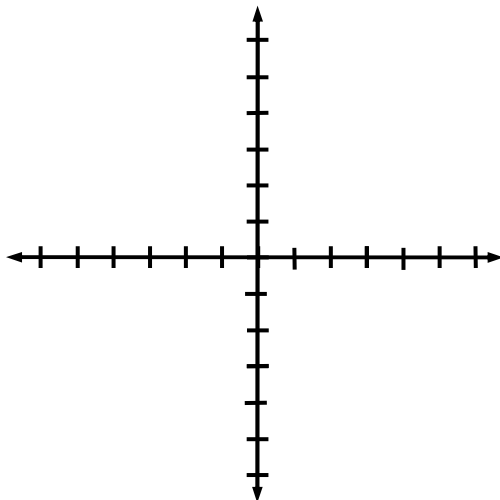
37. $y = \csc \frac{1}{4}x$



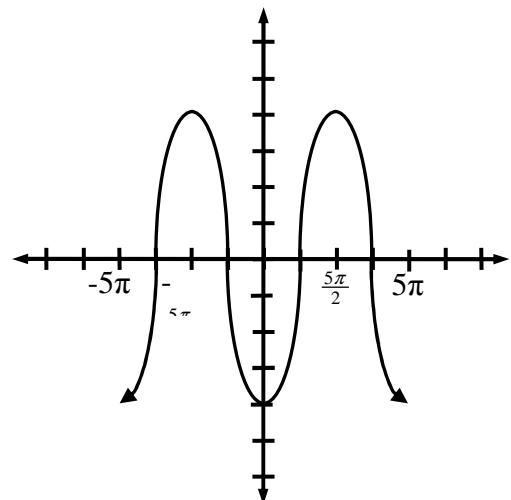
38. $y = \cot(3x)$



39. $y = 3 \tan x$



40. Write a function for the graph below.



Analytic Trigonometry (Chapter 6)

Find values to answer the following questions.

<p>41. If $\tan \alpha = -\frac{3}{4}$ when $\frac{\pi}{2} < \alpha < \pi$ and $\cos \beta = \frac{5}{13}$ when $\frac{3\pi}{2} < \beta < 2\pi$, what is the <i>exact</i> value of $\tan(\alpha + \beta)$?</p>	<p>42. When P(2, -5) is on the terminal side of θ in standard position, what is the value of $\cos 2\theta$?</p>
<p>43. If $\cos \alpha = \frac{3}{5}$ and $\frac{3\pi}{2} < \alpha < 2\pi$, what is the value of $\sin \frac{\alpha}{2}$?</p>	<p>44. What is the solution of $\sin \theta = 0.8704$ to the nearest hundredth of a degree?</p>
<p>45. What is the solution of $\sec \theta = 1.8492$ to the nearest hundredth of a radian?</p>	<p>46. What are the solution(s) of $2 \cos^2 \theta + 1 = -3 \cos \theta$ if θ is in the interval $[0, 2\pi)$?</p>

Prove the following identities.

$$47. \frac{\tan \theta}{\csc \theta} = \sec \theta - \cos \theta$$

$$48. \frac{\sin \theta}{\tan \theta} + \frac{\cos \theta}{\cot \theta} = \sin \theta + \cos \theta$$

Use reference triangles to find the exact value of each of the following expressions.

$$49. \sec \left[\sin^{-1} \left(-\frac{5}{6} \right) \right]$$

$$50. \cos^{-1} \left[\sin \frac{2\pi}{3} \right]$$

Solve the equations below on the interval $0 \leq \theta < 2\pi$.

$$51. \cos^2 \theta - 1 = 0$$

$$52. 2 \sin \theta + 3 = 4$$

Conics: (Chapter 9)

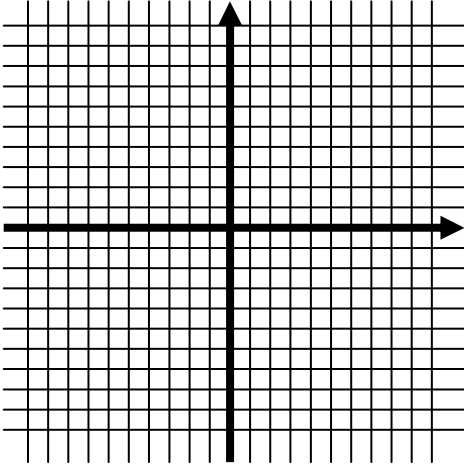
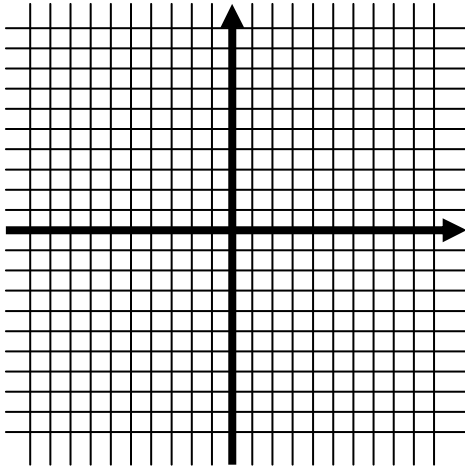
Classify each conic section.

53. $5x^2 - 3x - y + 20 = 0$	54. $16y^2 - 25x^2 + 8y = 50$	55. $12x^2 + 7y^2 - x + y = 8$	56. $x^2 + y^2 - 4x = 100$
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Find the standard form of the equation the conic given...

57. a parabola whose vertex is (5, 2) and focus is (3, 2).	58. an ellipse whose center is at (3, 2), $a = 3c$ and foci at (1, 2) and (5, 2).	59. a hyperbola whose vertices are (0, 2) and (6, 2) and whose asymptotes are $y = \frac{2}{3}x$ and $y = 4 - \frac{2}{3}x$.
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Classify and graph each conic. Identify and label the essential elements to draw the graph.

60. $4x^2 + 25y^2 + 16x - 150y + 141 = 0$ 	61. $y^2 - 4x^2 - 2y - 48x + 113 = 0$ 
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62. A semielliptical arch over a tunnel for a road through a mountain has a major axis of 100 feet and a height at the center of 40 feet. How high is the arch 5 feet from the edge of the tunnel?

Matrices: (Chapter 10)

$$A = \begin{bmatrix} 5 & -1 \\ -2 & 3 \end{bmatrix}$$

$$B = \begin{bmatrix} 0 & 7 \\ 4 & -6 \end{bmatrix}$$

$$C = \begin{bmatrix} 1 & -3 \\ 6 & 0 \\ 2 & 4 \end{bmatrix}$$

Find each product, if possible. NO calculators!

63. AB	64. AC	65. CA
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Solve each system using inverse matrices or row operations. Choose two different methods!

66. $\begin{cases} 2x - 5y = 2 \\ 3x - 7y = 1 \end{cases}$	67. $\begin{cases} 2x + 6z = -9 \\ 3x - 2y + 11z = -16 \\ 3x - y + 7z = -11 \end{cases}$
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68. The University of Georgia and Florida State University scored a total of 39 points during the 2003 Sugar Bowl. The points came from a total of 11 scoring plays, which were a combination of touchdowns, extra-point kicks, and field goals, worth 6, 1, and 3 points respectively. The same number of touchdowns and field goals were scored. How many touchdowns, extra-point kicks and field goals were scored during the game?

69. The graph of a quadratic function in the form $y = ax^2 + bx + c$ contains the points $(-2, -2)$, $(1, 7)$ and $(3, -7)$. What are the values for a , b , and c in this function?

70. What is the average rate of change of $f(x) = 2x^2 - 5x + 9$ from 1 to 3?

Average Rate of Change: _____

72. For θ in the interval $[0, 2\pi)$, what are the solutions of the equation below?

$$2\sin(3\theta) + 1 = 0$$

71. If the terminal side of θ intersects the unit circle at $P\left(\frac{20}{29}, -\frac{21}{29}\right)$, what are the values of the six trigonometric functions?

$$\sin \theta = \underline{\hspace{2cm}} \quad \cos \theta = \underline{\hspace{2cm}} \quad \tan \theta = \underline{\hspace{2cm}}$$

$$\csc \theta = \underline{\hspace{2cm}} \quad \sec \theta = \underline{\hspace{2cm}} \quad \cot \theta = \underline{\hspace{2cm}}$$

73. Find the *exact value* of the expression below.

$$\tan\left(\sin^{-1}\left(-\frac{4}{5}\right) + \cos^{-1}\frac{5}{13}\right)$$