Full Name: _____

THE BEAR CREEK SCHOOL

Preparing for Calculus

Summer Review Problems

A review of select skills from through Precalculus

Instructions:

- Start the review packet a few weeks before the beginning of the school year. It is divided into sections A-G so you can pace yourself.
- An answer key is provided, and checking your answers is an essential part of your mathematical success. You should persist in working each problem in this review guide until it is correct.
- This summer assignment will be counted in the homework category, worth 50 points.

  30 points – completeness, 20 points – select problems will be chosen and graded on accuracy

Section A – Functions

Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

1. If $f(x) = 4x - x^2$, find
   a) $f(4)$

   b) $f(4) - f(-4)$

2. If $V(r) = \frac{4}{3}\pi r^3$, find
   a) $V\left(\frac{3}{4}\right)$

   b) $V(r+1) - V(r-1)$

#3-8 Write the domain of the following functions using interval notation.

3. $y = x^3 - x^2 + x$

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

5. $y = \sqrt{2x - 9}$

6. $y = \dfrac{x - 4}{x^2 - 16}$

7. $f(x) = \frac{1}{4x^2 - 4x - 3}$

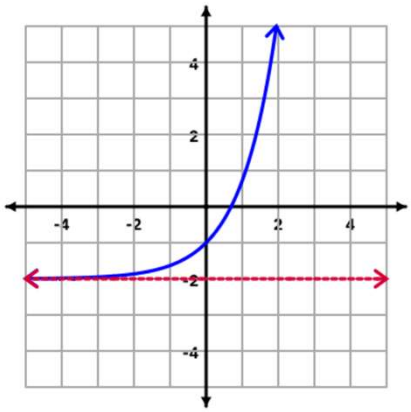
8. $y = \dfrac{\sqrt{2x + 14}}{x^2 - 49}$

Section B – Graphs of Functions

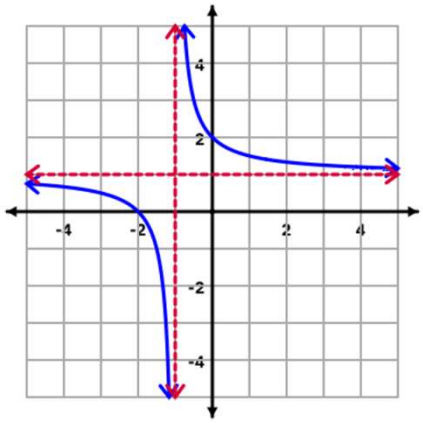
Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

#1-3: Write the domain and range of the functions shown, using interval notation

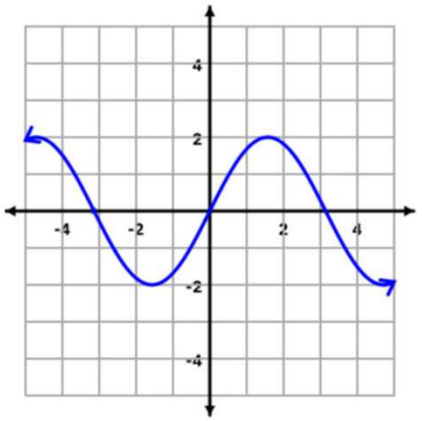
1.



2.

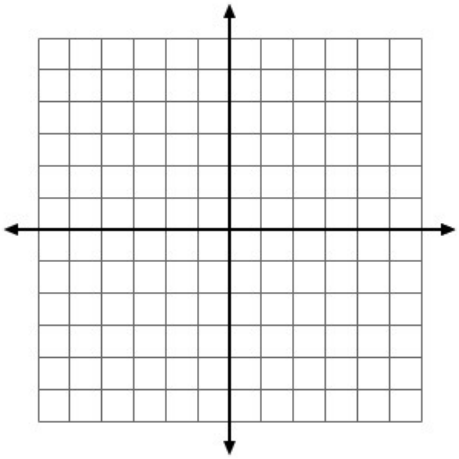


3.

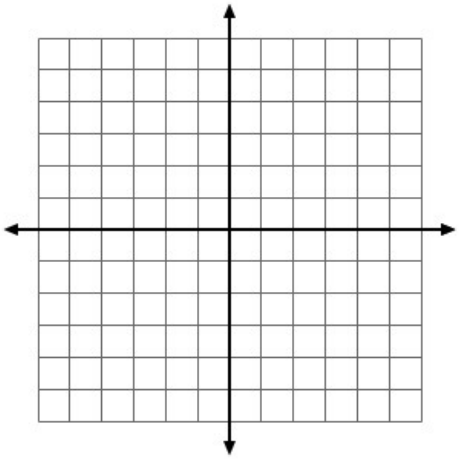


#4-9 Graph the following functions accurately, with *minimum* three points per graph.

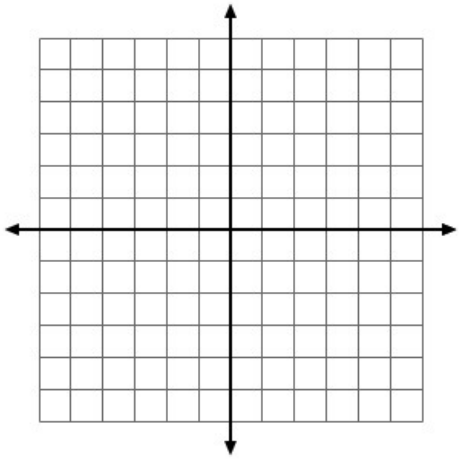
4. $y = x^2$



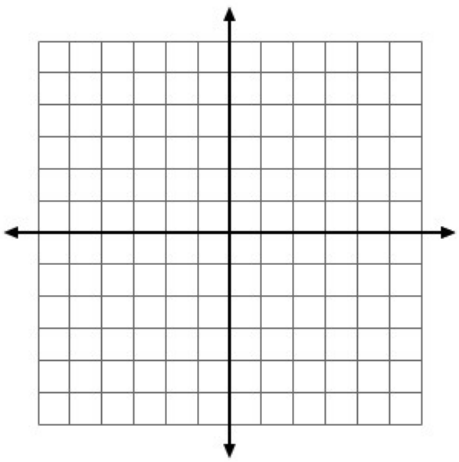
5. $y = x^3$



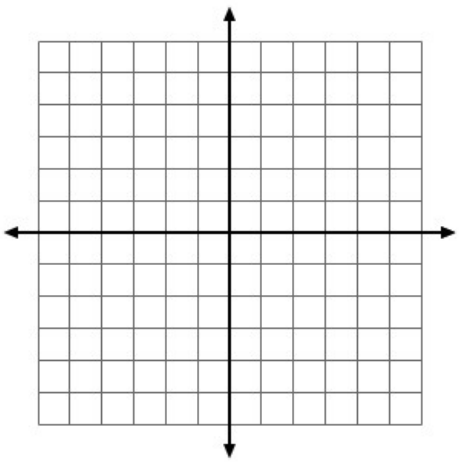
6. $y = \sqrt{x}$



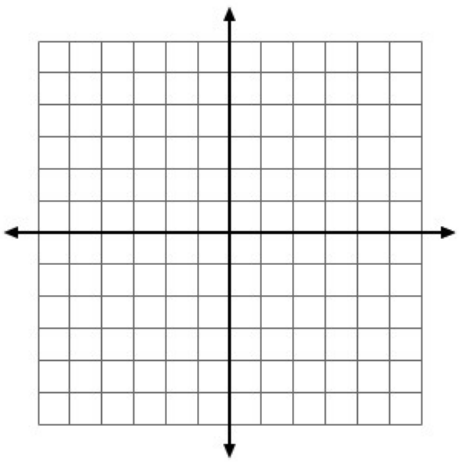
7. $y = |x|$



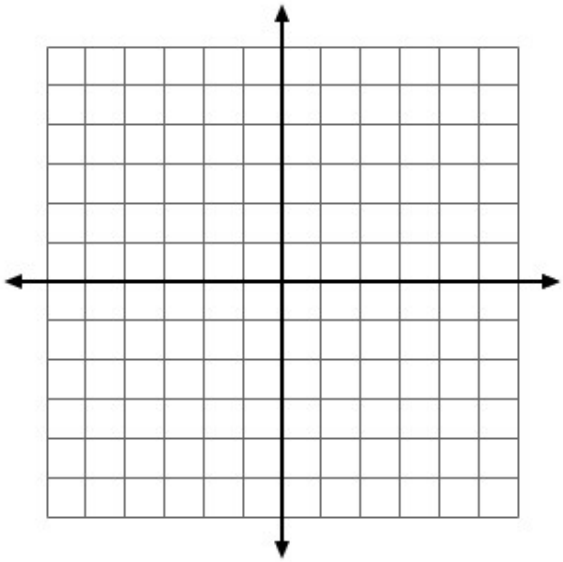
8. $y = \frac{|x|}{x}$



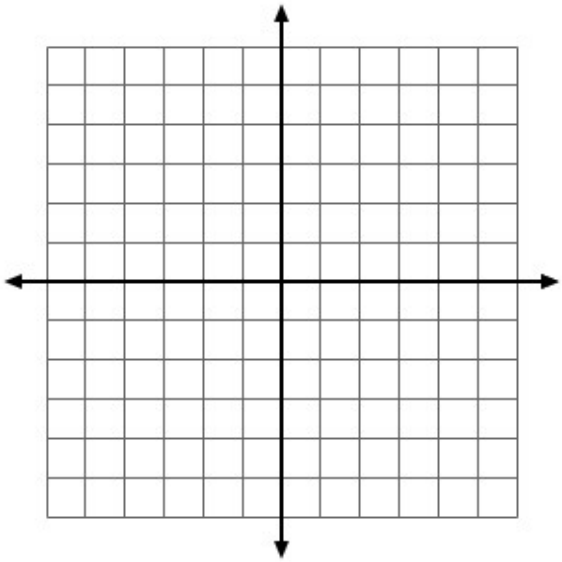
9. $y = \frac{1}{x}$



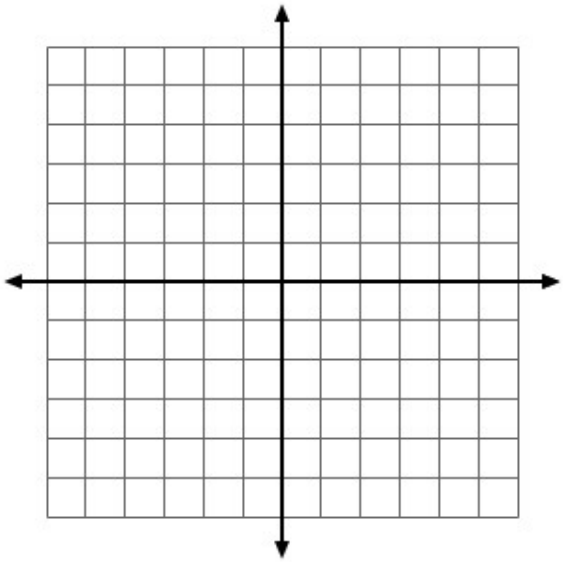
10. $y = e^x$



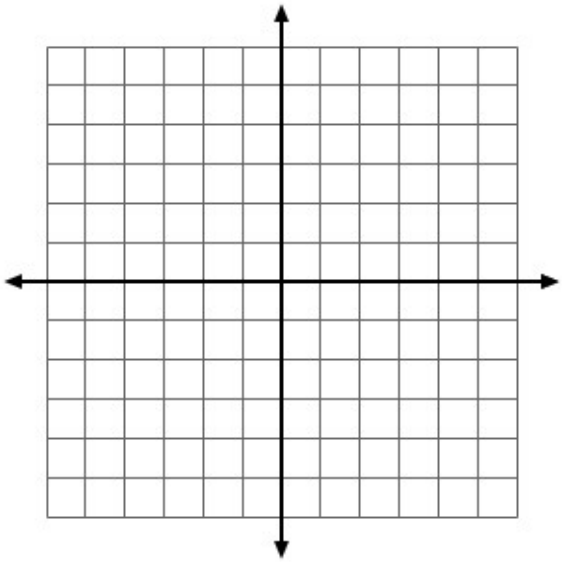
11. $y = \ln x$



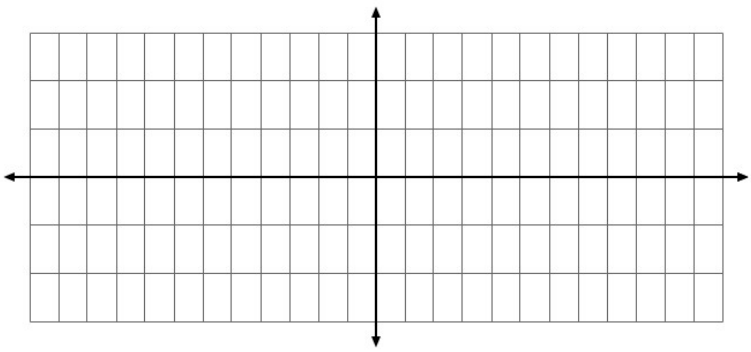
12. $y = \frac{1}{x^2}$



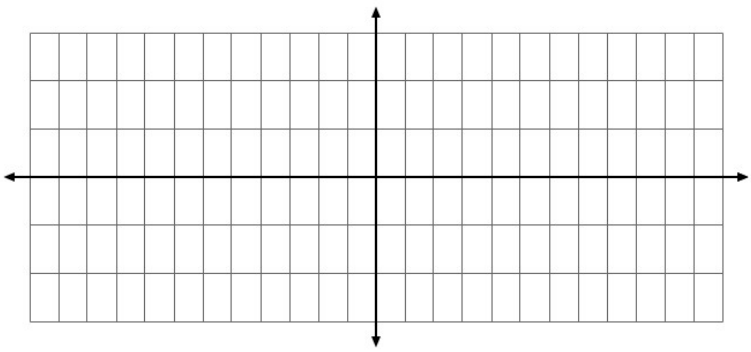
13. $y = \sqrt{4 - x^2}$



14. $y = \sin x$



15. $y = \cos x$



Section C – Factoring

Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

#1-8: Factor the expression completely.

1. $x^2 - 16x + 63$

2. $7m^2 - 31m - 20$

3. $28n^4 + 16n^3 - 80n^2$

4. $x^3 - 8$

5. $9x^4 - 81$

6. $30n^2b - 87nb + 30b$

7. $\cos\theta \cot\theta - \cos\theta$

8. $\sin^2\theta - \cos^2\theta$

Section D – Linear Functions

Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

#1-6 Write the equation of the line described, in point-slope form. $y - y_1 = m(x - x_1)$

1. $m = -7$, through $(-3, -7)$

2. $m = \frac{2}{3}$, through $\left(-6, \frac{1}{3}\right)$

3. Passes through the points $(-3,6)$ and $(-1,2)$

4. Passes through the points $\left(\frac{1}{2}, 1\right)$ and $\left(-2, \frac{2}{3}\right)$

5. Parallel to $5x + 2y = 7$, passing through the point $(-6,2)$

6. Perpendicular to the line $5x + 2y = 7$, passing through the point $(-6,2)$

7. Find k so that the lines $3x - 5y = 9$ and $6x + ky = 11$ are parallel.

Section E – Solving Polynomial Equations

Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

#1-7: For each equation, find all solutions, including multiplicity when relevant.

1. $x^2 + x + \frac{1}{4} = 0$

2. $2x^2 - 72 = 0$

3. $12x^2 - 5x = 2$

4. $81x^2 + 72x + 16 = 0$

5. $x + \frac{1}{x} = \frac{17}{4}$

6. $2x^4 - 15x^3 + 18x^2 = 0$

7. $x^3 - 5x^2 + 5x - 25 = 0$

Section F – Rational Functions

Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

#1-6: For each function, identify any vertical asymptotes, horizontal asymptotes, and holes.

1. $y = \frac{x-1}{x+5}$

2. $y = \frac{2x+16}{x+8}$

3. $y = \frac{2x^2+16}{x^2+5x+6}$

4. $y = \frac{x}{x^2-25}$

5. $y = \frac{x^3}{x^2+4}$

6. $y = \frac{10x+20}{x^3-2x^2-4x+8}$

Section G – Trigonometry

Check each answer using the key in the back. If your answer does not match the key, revise your work until it does.

#1-9 Evaluate without using a calculator.

1. $\cos\frac{2\pi}{3}$	2. $\tan\pi$	3. $\sin\left(-\frac{\pi}{4}\right)$
4. $\sec\left(\frac{\pi}{2}\right)$	5. $\tan\left(\frac{7\pi}{4}\right)$	6. $\cos\left(\frac{7\pi}{6}\right)$
7. $\cot\left(-\frac{\pi}{2}\right)$	8. $\sin 5\pi$	9. $\sec 0$

#10-12 Identify the quadrant in which each of the following are true.

10. $\sin\theta > 0$ and $\cos\theta < 0$	11. $\csc\theta < 0$ and $\cot\theta > 0$	12. $\tan\theta > 0$ and $\sec\theta < 0$

13. If $\cos\theta = -\frac{1}{2}$ and θ is in Quadrant II, find $\sin\theta$ and $\tan\theta$

#14-18: Solve each trig equation on the interval $[0,2\pi)$

14. $\sin^2\theta = \sin\theta$

15. $3\tan^3\theta = \tan\theta$

16. $3\sqrt{2}\cos\theta + 2 = -1$

17. $\sin 3\theta = -1$

18. $2\sin^2\theta - 3\sin\theta + 1 = 0$

19. Fill in the blanks to complete each identity:

$\sin^2\theta + \cos^2\theta =$ _____ $1 +$ _____ $= \sec^2\theta$ $1 + \cot^2\theta =$ _____

$\sec\theta = \frac{1}{\text{—}}$ $\frac{\sin\theta}{\cos\theta} =$ _____ $\frac{1}{\csc\theta} =$ _____

Answer Key – Section A

A1 a	0	**A4**	$(-\infty, 0) \cup (0, \infty)$
A1 b	32	**A5**	$[9/2, \infty)$
A2 a	$\frac{9\pi}{16}$	**A6**	$(-\infty, -4) \cup (-4, 4) \cup (4, \infty)$
A2 b	$\left(\frac{8\pi}{3}\right)(3r^2 + 1)$	**A7**	$\left(-\infty, -\frac{1}{2}\right) \cup \left(-\frac{1}{2}, \frac{3}{2}\right) \cup \left(\frac{3}{2}, \infty\right)$
A3	$(-\infty, \infty)$	**A8**	$(-7, 7) \cup (7, \infty)$

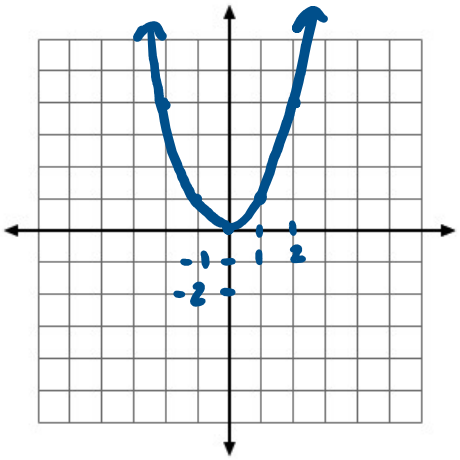
Answer Key – Section B

B1 **Domain:** $(-\infty, \infty)$
Range: $(-2, \infty)$

B2 **Domain:**
$(-\infty, -1) \cup (-1, \infty)$
Range:
$(-\infty, 1) \cup (1, \infty)$

B3 **Domain:** $(-\infty, \infty)$
Range: $[-2, 2]$

4. $y = x^2$



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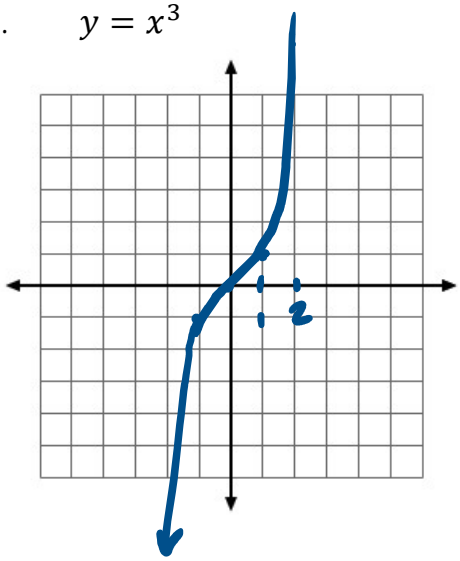

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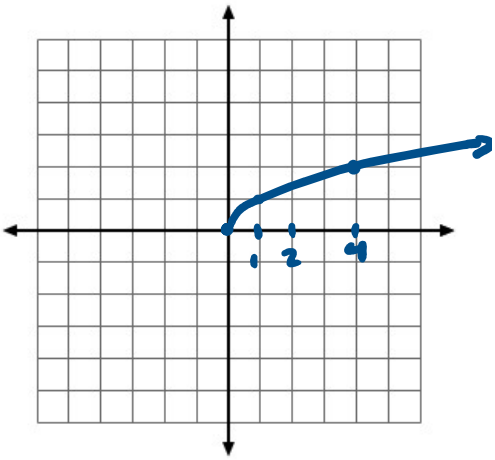
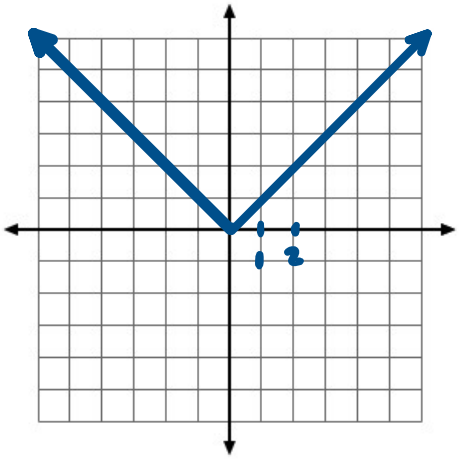
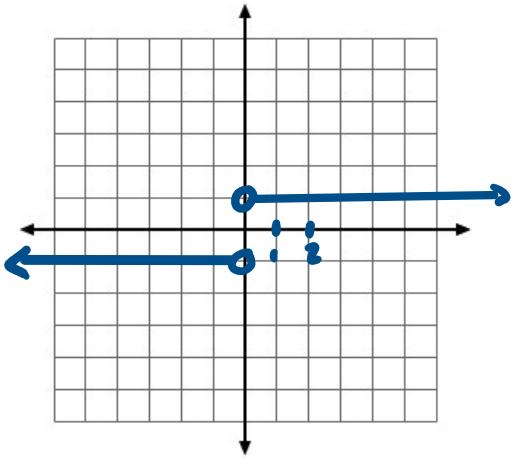


7. $y = |x|$



8. $y = \frac{|x|}{x}$



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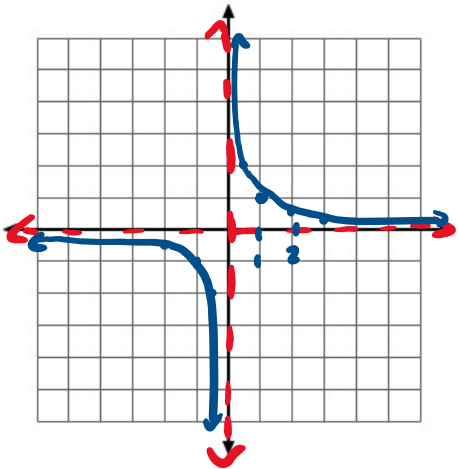

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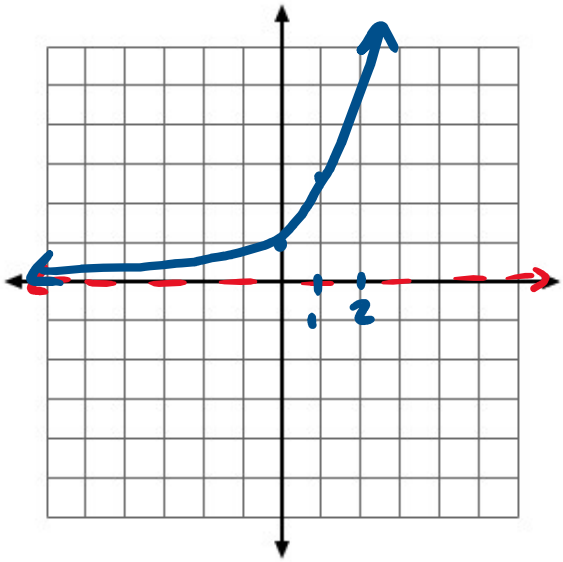

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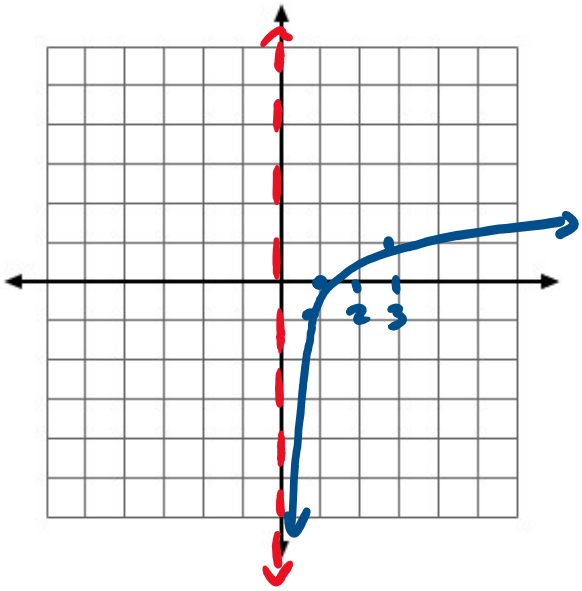
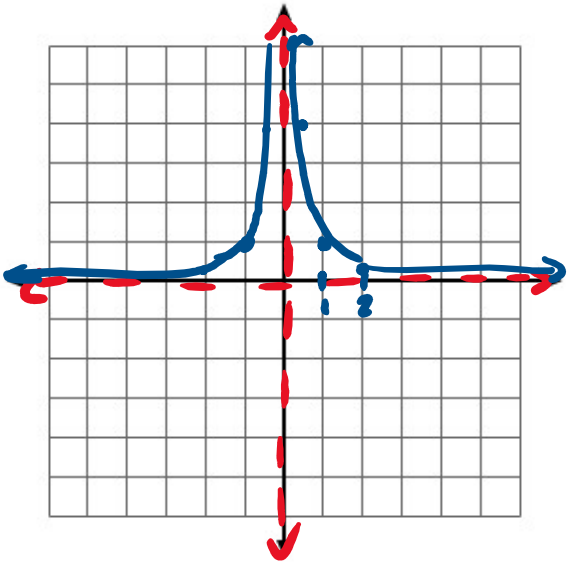
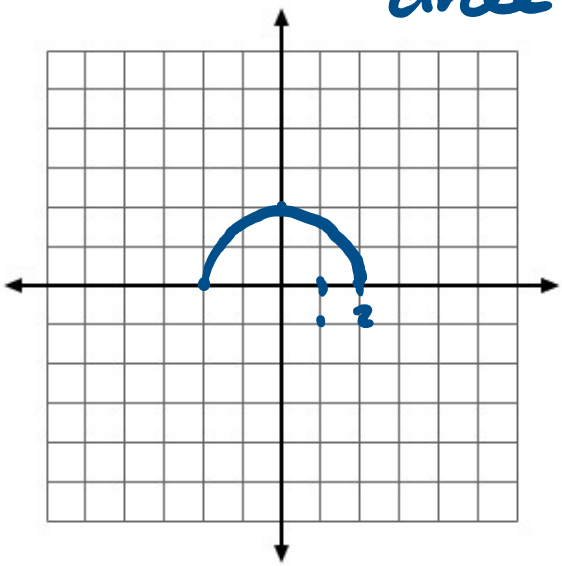


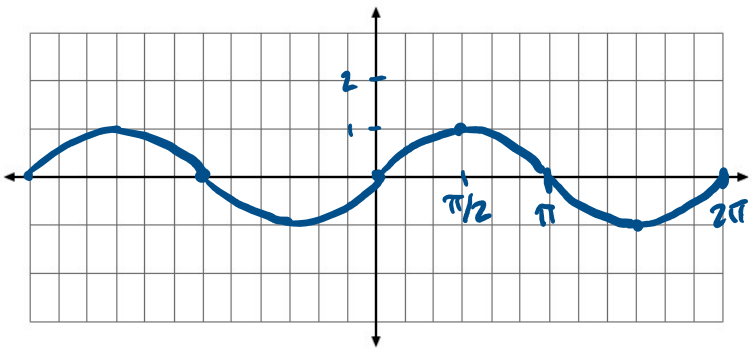
12. $y = \frac{1}{x^2}$



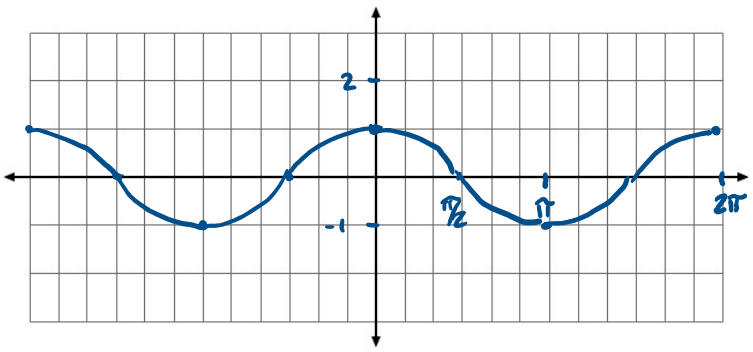
13. $y = \sqrt{4 - x^2}$ top half of $x^2+y^2=4$ circle



14. $y = \sin x$



15. $y = \cos x$



Answer Key – Section C

C1	$(x - 7)(x - 9)$	**C5**	$9(x^2 - 3)(x^2 + 3)$
C2	$(7m + 4)(m - 5)$	**C6**	$3b(5n - 2)(2n - 5)$
C3	$4n^2(7n - 10)(n + 2)$	**C7**	$\cos\theta(\cot\theta - 1)$
C4	$(x - 2)(x^2 + 2x + 4)$	**C8**	$(\sin\theta - \cos\theta)(\sin\theta + \cos\theta)$

Section D

D1	$y + 7 = -7(x + 3)$	**D5**	$y - 2 = -5/2(x + 6)$
D2	$y - 1/3 = 2/3(x + 6)$	**D6**	$y - 2 = 2/5(x + 6)$
D3	$y - 2 = -2(x + 1)$ or $y - 6 = -2(x + 3)$	**D7**	$k = -10$
D4	$y - 1 = 2/15(x - 1/2)$ or $y - 2/3 = -2/15\ (x + 2)$		

Section E

E1	$x = -\frac{1}{2}$ (multiplicity 2)	**E5**	$x = \frac{1}{4}\ or\ x = 4$
E2	$x = \pm 6$	**E6**	$x = 0$ (multiplicity 2), $\frac{3}{2}, 6$
E3	$x = -\frac{1}{4}\ or\ x = \frac{2}{3}$	**E7**	$x = 5, \pm i\sqrt{5}$
E4	$x = -\frac{4}{9}$ (multiplicity 2)		

Section F

F1	VA: x = −5 | HA: y = 1 | Holes: none	**F4**	VA: x = ±5 | HA: y = 0 | Holes: none
F2	VA: none | HA: y = 2 | Hole at $x = -8$	**F5**	VA: none | HA: none | Holes: none
F3	VA: x = −2, x = −3 | HA: y = 2 | Holes: none	**F6**	VA: x = 2 | HA: y = 0 | Hole at $x = -2$

Answer Key – Section G

G10	Quadrant II	**G14**	$\theta = 0, \frac{\pi}{2}, \pi$
G11	Quadrant III	**G15**	$\theta = 0, \frac{\pi}{6}, \frac{5\pi}{6}, \pi, \frac{7\pi}{6}, \frac{11\pi}{6}$
G12	Quadrant III	**G16**	$\theta = \frac{3\pi}{4}, \frac{5\pi}{4}$
G13	$\sin\theta = \frac{\sqrt{3}}{2}, \tan\theta = -\sqrt{3}$	**G17**	$\theta = \frac{3\pi}{4}, \frac{7\pi}{4}$
G18	$\theta = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$	**G19**	Below

$\sin^2\theta + \cos^2\theta = 1$ $\quad$ $1 + \tan^2\theta = \sec^2\theta$ $\quad$ $1 + \cot^2\theta = \csc^2\theta$

$\sec\theta = \frac{1}{\cos\theta}$ $\quad$ $\frac{\sin\theta}{\cos\theta} = \tan\theta$ $\quad$ $\frac{1}{\csc\theta} = \sin\theta$