Pre-Calculus Review: CHAPTERS 8, 9, 10 Miscellaneous **Name:** _____

1. Explain how we know if an infinite series converges or diverges.

2. Find the first 5 terms of the sequence:

   a. $a_1 = 8, a_n = a_{n-1} - 3$ b. $j_n = 3(n-1)^2$ c. $k_n = \frac{4}{n+2}$

3. Find an explicit formula for the nth term of the following sequences:

   a. $-7, -1, 5, 11, \ldots$ b. $3, 6, 12, \ldots, 768$ c. $a_4 = 135, a_7 = 3645$ (geometric, ends at 7th term)

4. For the sequences in #3, write the sum of the series in sigma notation.

5. Are the series geometric or arithmetic? Will each converge or diverge? If it converges, find the sum.

   a. $17 + 27 + 37 + \cdots + 417$ b. $\frac{1}{64} + \frac{1}{32} + \frac{1}{16} + \frac{1}{8} + \cdots$ c. $6 - 3 + \frac{3}{2} - \frac{3}{4} + \cdots$

Arithmetic Sequences and Series	**Geometric Sequences and Series**
$a_n = a_1 + (n-1)d$	$a_n = a_1(r)^{n-1}$
$S_n = n\left(\frac{a_1+a_n}{2}\right) = \frac{n}{2}[2a_1 + (n-1)d]$	$S_n = \frac{a_1(1-r^n)}{1-r}$ $(r \neq 1)$
	$S = \frac{a_1}{1-r}$

6. Determine the type of conic represented by each equation.

   a. $y - 3x^2 + x = 8$ b. $y^2 + x^2 + x - 2y = 8$ c. $-x^2 + y^2 + 3x - y = 12$ d. $4y^2 + 3x^2 + x - 2y = 8$

Graph each conic. Depending on the type, indentify the following properties: vertex (vertices), focus (foci), directrix, axis of symmetry, center, ecentricity, and asypmtotes.

7. $y^2 - 4x - 4 = 0$

8. $x^2 - 2x + y^2 + 16y + 40 = 0$

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

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

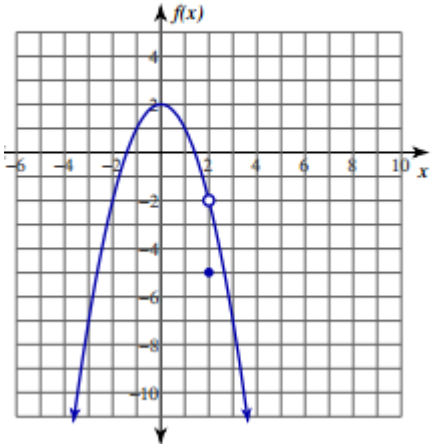
Write the equation of each conic described.

11. A circle with center at (3, 7) and point on the circle at (1, -3).
12. A parabola that opens to the right with a vertex (-7, -5) and passes through the point (2, -1).
13. An ellipse with vertices at (8, 0) and (-8, 0) and foci at (5, 0) and (-5, 0).
14. A hyperbola with center at (4, -2), vertex at (6, -2), and focus at (7, -2).

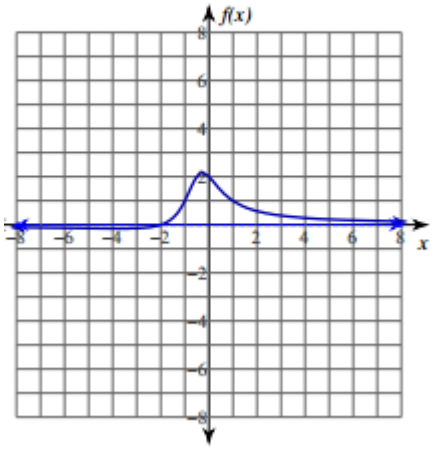
Evaluate the limits below:

15. $\lim_{x\to-\infty}(5x)$ 16. $\lim_{x\to3^+}\left(\frac{1}{x^2-9}\right)$ 17. $\lim_{x\to-\infty}\frac{x^5+x^4+x^3+x^2+x+1}{x^3-6}$ 18. $\lim_{x\to-10}\frac{x^2+13x+30}{x^2+18x+80}$

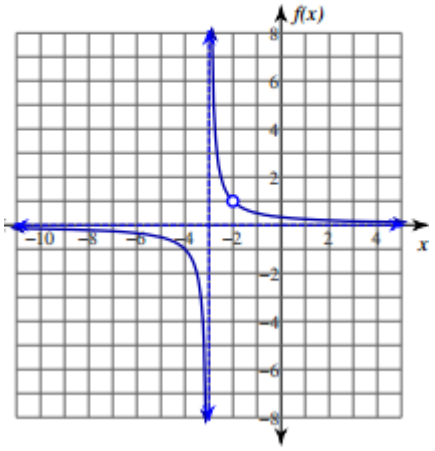
19. $\lim_{x\to2} f(x),\ f(x)=\begin{cases}-x^2+2, & x\neq2\\ -5, & x=2\end{cases}$



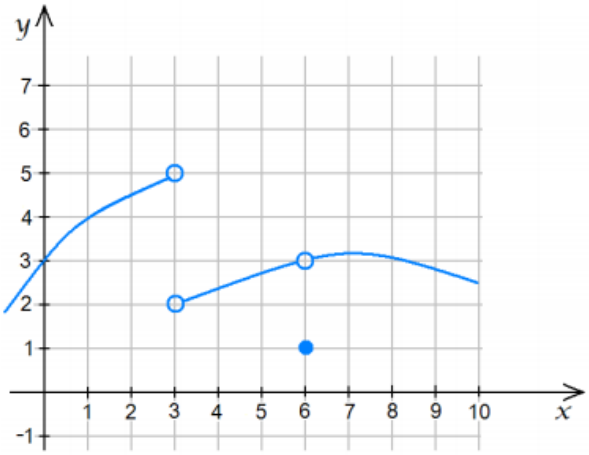
20. $\lim_{x\to-\infty}\frac{x+2}{x^2+x+1}$



21. $\lim_{x\to-3^+}\frac{x+2}{x^2+5x+6}$



22. Use this graph to answer the limit questions below.



a) $\lim_{x\to3^-} f(x)$

b) $\lim_{x\to3^+} f(x)$

c) $\lim_{x\to3} f(x)$

d) $f(3)$

e) $\lim_{x\to6^-} f(x)$

f) $\lim_{x\to6^+} f(x)$

g) $\lim_{x\to6} f(x)$

h) $f(6)$