1. Use completing the square to write the equation of the appropriate conic section. Identify the conic section and its center.

a) $x^{2} + y^{2} + 6x - 4y + 2 = 0$ b) $5x^{2} - 8y^{2} - 20x + 64y - 148 = 0$ c) $4y^{2} + 7x^{2} + 16y - 56x + 100 = 0$

2. Eliminate the parameter and indicate the domain of the Cartesian equation.

a)
$$x = \frac{1}{4}t$$
 for $-\infty \le t \le \infty$
 $y = t^2$

$$x = t + 1$$

b)
$$y = \frac{t}{t+1} \qquad \text{for } t \in (-\infty, -1) \cup (-1, \infty)$$

c)
$$\begin{array}{l} x = 2t \\ y = t + 4 \end{array}$$
 for $-2 \le t \le 3$

d)
$$x = 9 \sin t$$

 $y = 9 \cos t$ for $0 \le t \le 2\pi$, what conic section is this? What is the center?

e)
$$x = 5 \tan t$$

 $y = 3 \sec t$ for $0 \le t \le 2\pi$, what conic section is this? What is the center?

f) $x = 2 + 3\cos t$ $y = -5 + 2\sin t$ for $0 \le t \le 2\pi$, what conic section is this? What is the center?

- 3. Write a parametric equation for $y = 3x^2 + 6$.
- 4. Write the first 5 terms of the sequence (assume *n* begins at 1) $a_n = \frac{(-1)^{n+1}}{n^2 + 1}$
- 5. Write the first 5 terms of the sequence $a_1 = 5$ and $a_{n+1} = -3a_n + 2$
- 6. Write an expression for the n^{th} term of the sequence (assume *n* begins at 1): a) $\frac{2}{1}, \frac{3}{3}, \frac{4}{5}, \frac{5}{7}, \frac{6}{9}, \dots$ b) 1, 4, 7, 10, 13, ...

7. Use sigma notation to write the sum 3-9+27-81+243-729.

8. Let
$$\sum_{n=1}^{7} a_n = 51$$
 and $\sum_{n=1}^{7} b_n = -6$. Find $\sum_{n=1}^{7} \left(4a_n - \frac{1}{2}b_n \right)$.

9. For the arithmetic sequence 5,16,27,38,49,...
a)find the common difference d
b) the nth term

- 10. The first two terms of an arithmetic sequence are $a_1 = 5$ and $a_2 = 11$, find a_n and a_{10} .
- 11. Given the arithmetic sequence 2,11,20,... find n so that $a_n = 533$.
- 12. Find the common ratio for the geometric sequence $5, \frac{25}{3}, \frac{125}{9}, \frac{625}{27}, \dots$
- 13. Write the geometric series using sigma notation and then find the sum of the infinite series.

$$15+3+\frac{3}{5}+\frac{3}{25}+\dots$$

14. For the geometric series where $a_1 = 2$ and r = -2 find a_{10} .

15. Find
$$\sum_{n=0}^{\infty} 40 \left(-\frac{2}{7}\right)^n$$

16. Find $\sum_{n=1}^{\infty} 5\left(\frac{2}{3}\right)^n$

17. Find the domain and range for :

a)
$$f(x) = \left(\frac{1}{2}\right)^x - 3$$
 b) $f(x) = 3 + \log(x - 1)$

- 18. Write the following in exponential form. a) $\log 10 = 1$ b) $\ln x = y$
- 19. Write in logarithmic form.

a)
$$e^2 = x$$
 b) $10^2 = 100$

20. Simplify the following completely without the use of a calculator.

a)
$$\ln \frac{1}{e}$$
 b) $\ln \sqrt[5]{e^3 x}$

21. Write the following as a sum, difference, or multiple of logarithms: $\ln \frac{5x}{\sqrt[3]{x^2 + 1}}$ 22. Write the following as a sum, difference, or multiple of logarithms: $\ln \frac{x^2\sqrt{5x+1}}{(3x-2)^3}$ 23. Write the following as the logarithm of a single quantity: $\frac{1}{3} \Big[2 \log(x^2 + 1) - 3 \log(x - 3) - \log 4 \Big]$ Solve the following for x. Round answers to three decimal places where needed.

24.
$$2=5^{3x-1}$$

25. $e^{2x}-3e^{x}=4$
26. $\log(7-x)-\log(3x+2)=1$
27. $\ln(7-x)+\ln(3x+5)=\ln(24x)$
28. $-x^{2}e^{-x}+2xe^{-x}=0$
29. Write the partial fraction decomposition of: $\frac{x+7}{x^{2}-x-6}$
30. Write the partial fraction decomposition of: $\frac{3x^{2}+4x+4}{x^{3}+4x}$
31. Write the partial fraction decomposition of: $\frac{2x^{2}+7x+4}{(x+1)^{3}}$
32. Write the partial fraction decomposition of: $\frac{x+2}{x(x^{2}-9)}$
33. Write the partial fraction decomposition of: $\frac{2x^{3}-x^{2}+x+5}{x^{2}+3x+2}$