Enough work must be shown to justify your answers. Make sure that you are answering the question that is being asked. All explanations must be coherent and written in college level English.
Each problem is worth 10 points.

1. If $\log_3 2 = A$, $\log_3 5 = B$ and $\log_3 7 = C$ write the following in terms of A, B, and C.
    a) $\log_3 \frac{35}{3}$ b) $\log_3 140$

2. Solve for x:
    $\log_x \left[\frac{625}{16}\right] = 4$

3. Let $\log_b A = 2.227$ and $\log_b B = 1.365$. Find $\log_b \frac{A}{B}$.

4. Solve the following equation for x: $\log_5(x^2 + 1) = 2$

5. Suppose Javonia has \$1000 to invest at 8% per year compounded quarterly, how long will it take before she has \$1150?

6. Since 1950, the growth in world population in millions closely fits the function $A(t) = 2600e^{0.018t}$, where t is the number of years since 1950. Estimate the population in the year 2003 to the nearest million.
    a) 36,152,864 million   b) 6750 million   c) 6872 million   d) 6629 million

7. (a) Graph the region that satisfies the constraints:

$$x \geq 0, \quad y \geq 0, \quad x \leq 3, \quad y \leq 4, \quad 5x + 4y \geq 20$$

    (b) Find the maximum and minimum values of the objective function

$$z = 10x - 8y + 28$$

    subject to the constraints in part (a) and indicate the coordinates x and y at which they occur.

8. For the arithmetic sequence $\{s_n\}$, find the common difference and write out the first six (6) terms.

$$\{s_n\} = \left\{\frac{2}{3} + \frac{n}{4}\right\}$$

9. Evaluate $\displaystyle\sum_{k=1}^{5} k^3 - 9$.

10. For each sequence below, determine if the sequence is arithmetic, geometric, or neither. If arithmetic, find common difference and 67th term. If geometric, find common ratio and 8th term.

    (a) $2, -2, -6, -10, \ldots$ (b) $3, \frac{-3}{2}, \frac{3}{4}, \frac{-3}{8}, \ldots$

11. Find the sum of the sequence whose general term is $a_n = \frac{3^{n-1}}{4^n}$

12. In how many ways can a committee consisting of 3 faculty members and 5 students be formed if 7 faculty members and 12 students are eligible to serve on the committee ?

13. On the local news the weather reporter stated that the probability of snow tomorrow is 55%. What is the probability that it will not snow ?

14. For each equation shown, indicate whether it is the equation of a circle, parabola, ellipse, hyperbola, or non-conic.

   a) $8x^2 + 3y^2 - 7x + 13 = 0$ b) $6x^2 - 6y^2 + 5x - 2y = 0$

   c) $3x^2 + 8x + 9y + 21 = 0$ d) $9x^2 + 9y^2 - 4x + y - 7 = 0$

15. Sketch the graph of any two of the following:

   a) $\dfrac{x^2}{9} - \dfrac{y^2}{25} = 1$ b) $(x - 2)^2 + 16(y + 3)^2 = 64$ c) $y^2 + 2x - 4y - 4 = 0$

16. Find the center, foci and vertices of either of the conics below.

   a) $2x^2 + y^2 - 8x - 6y - 1 = 0$ b) $2x^2 - y^2 - 8x - 6y + 1 = 0$

17. Solve the system of equations

$$x + 2y - z = -3$$
$$2x - 4y + z = -7$$
$$-2x + 2y - 3z = 4$$

Do any 3 of the following 5 problems.

18. List all asymptotes for the graph of the following rational function.

$$y = \frac{2x^3 - 7x^2}{(5x - 2)(x^2 + 4)}$$

19. For the polynomial function shown, a) list each real zero and its multiplicity; b) describe its end behavior; c) determine the maximum number of turning points on the graph; d) indicate the intervals where the graph is above the x-axis and the intervals where the graph is below the x-axis.

$$f(x) = 2(x^2 - 1)^2(x + 3)^3$$

20. Graph the system of inequalities.

$$\begin{cases} 11x^2 + y^2 \geq 99 \\ x + y \leq 3 \end{cases}$$

21. A soccer team split into two groups when waiting in line for food at a fast food counter. The first group bought 8 slices of pizza and 7 soft drinks for $35.68. The second group bought 7 slices of pizza and 5 soft drinks for $29.42. How much does one slice of pizza cost?

22. Find s such that $s - 1$, s, and $s + 2$ are consecutive terms of a geometric sequence.