1. Simplify:
   (a) $x^4y^3x^{-1}y^2$
   (b) $(x^3y^2)^4$
   (c) $\sqrt{x^4y^{-8}}$
   (d) $\frac{x^{1/3}}{x^{1/5}}$

2. Compute the following without using a calculator:
   (a) $5^0$
   (b) $27^{2/3}$
   (c) $3^{-2}$
   (d) $49^{-1/2}$
3. Use a calculator to compute the following. Give your answers as decimals to 2 decimal places.

(a) $\sqrt[4]{25}$  
(b) $\sqrt[3]{10}$

(c) $(\sqrt[5]{17})^3$  
(d) $5^{2/3}$

(e) $3^{-2}$  
(f) $7^{-1/2}$

4. Solve the following equations:

(a) $x^3 = 64$  
(b) $x^4 = 81$

(c) $x^5 = 100,000$  
(d) $x^5 = -1$
5. Solve the following equations:

(a) $\sqrt[3]{x} = 3$  
(b) $x^{1/3} = 4$

(c) $10 - 3\sqrt{x} = 2 + \sqrt{x}$  
(d) $2\sqrt{x} = 5\sqrt{x} - 9$

(e) $5 - x^3 = 4$  
(f) $x^{3/2} = 8$

(g) $x^{-3} = 8$  
(h) $\sqrt{x} = \frac{32}{\sqrt{x}}$
6. Express the following numbers in scientific notation, rounded to three digits:

(a) 1,325,000
(b) 0.003

(c) 13.5 trillion
(d) 0.000087

7. Compute the following. Express the answer in scientific notation, rounded to three digits.

(a) \((1.5 \times 10^{-4}) \times (2.6 \times 10^7)\)

(b) \((4.89 \times 10^8) \times (6.7 \times 10^{-3})\)

(c) \(\frac{2.89 \times 10^5}{3.71 \times 10^{-3}}\)

(d) \((5.1 \times 10^6)^4\)
8. The speed of light is $3 \times 10^8$ meters/second. If the sun is $1.5 \times 10^{11}$ meters from earth, how long does it take light to reach the earth. Give your answer in minutes.

9. The moon is approximately 240,000 miles from the Earth. A quarter is approximately 0.0625 inches thick. How many quarters would you need to reach the Earth’s moon if you were to stack them, one on top of each other, beginning at the Earth’s surface? Express your answer in scientific notation.
10. The world population in 1999 reached 5,996.17 million people and was growing at a rate of about 84 million people per year.

(a) Assuming that the population continues to grow linearly at this rate, write an equation for the population of the world in year $x$.

(b) Estimate the world population in 2020.

(c) In what year will the population be 10 billion?