

**SHOW ALL WORK.** Use a separate piece of paper and then record your answers to this page.

Find the intervals that satisfy the inequality.

1.  $x^2 + 18x + 80 > 0$

2.  $x^2 - 11x + 30 < 0$

3.  $x^2 + 7x \geq -10$

4.  $x^2 - 5x \leq 6$

5.  $x^2 + 6x \geq -8$

6.  $x^2 - 3x \leq 4$

7.  $3x^2 + 6x < 0$

8.  $3x^2 + 17x + 10 \geq 0$

9.  $\frac{1}{x-5} < 0$

10.  $\frac{1}{x-7} < 0$

11.  $\frac{x-2}{x+4} > 0$

12.  $\frac{x-3}{x+5} > 0$

13.  $\frac{2x+1}{x-3} \leq 0$

14.  $\frac{2x+1}{x-2} \leq 0$

15. A bottle of water is thrown upward with an initial velocity of 32 ft. / sec from a cliff that is 1920 feet high. For what time does the height exceed 1920 feet? (Use  $h(t) = -16t^2 + v_0t + h_0$ )

16. A company determines that its total profit function can be modeled by  $P(x) = -2x^2 + 480x - 16,000$ . Find all values of  $x$  for which it makes a profit.

17. A rocket is launched with an initial velocity of 24 m/sec from a platform that is 3 meters high. The rocket will burst into flames unless it stays below 25 meters. Find the interval of time before the rocket bursts into flames.

**Find the solution(s) to the following quadratic equations (using any method of choice, except graphing). Also, state the nature (rational, irrational, or complex) of the solutions.**

18.  $x^2 - 16x + 65 = 0$

19.  $-2(x - 1)^2 = 18$

**Find the vertex of the quadratic without using a calculator.**

20.  $h(t) = -16t^2 + 32t + 1920$

**Determine if the following polynomials are quadratic in nature. If so, factor using “u” substitution.**

21.  $4(x - 2)^2 - 25$

22.  $x^{\frac{1}{2}} + 4x^{\frac{1}{4}} - 3$