3U3 - Quadratic Functions Review

Solutions to the following problems wil be posted by tonight. Happy studying!

1. Graph the function $f(x) = 2(x-2)^2 - 8$. Label the vertex and axis of symmetry. Determine the y_{int} and its symmetric partner. Determine the point $\left(-1, f(-1)\right)$ and its symmetric partner.

2. Does the parabola for the function $f(x) = -3(x-8)^2 - 12$ open up or down? What is the range? Explain your answer.

3. A quadratic function has these characteristics:
   $x = 1$ is the equation for the axis of symmetry.
   $x = -1$ is an x-intercept.
   $y = -4$ is the minimum value.
   Determine the y-intercept of this parabola.

4. At a baseball game, workers toss T-shirts to spectators in the stands out of a sling-shot. The height of a T-shirt is modelled by the function $h(t) = -5t^2 + 20t + 1$ where $h(t)$ is height in metres and t is the time in seconds after the toss. What is the maximum height of the T-shirt if it is not caught? How much time does it take the T-shirt to reach maximum height?

5. Determine the maximum value for the function $f(x) = -x^2 - 4x - 32$ by completing the square. (Hint: First factor the -1 out of the first two terms).

6. The cost, $c(x)$, in dollars per hour of running a certain fishing boat is modelled by the function $c(x) = 0.9x^2 - 18.1x + 135.1$, where x is the speed in kilometres per hour. At what approximate speed should the boat travel to achieve minimum cost? (You'll need to use graphing tech for this problem).

7. The cost function for a container company is $C(x) = 10x + 30$ and the revenue function is $R(x) = -x^2 + 24x$, where x is the number of containers sold, in thousands. Determine the profit function for the number of containers sold. Then determine the number of containers sold that maximizes profit.

8. Determine the minimum value for the function $f(x) = 2x^2 + 8x + 6$ by factoring and finding the AoS.

9. Simplify. Explain how you found your answer.
   $5\sqrt{192}$

10. Simplify.
    $-4\sqrt{51} \times 6\sqrt{3}$

11. Simplify.
    $3\sqrt{12} + \sqrt{24} - 2\sqrt{36}$

12. Simplify $\left(7+\sqrt{50}\right)\left(-9-\sqrt{32}\right)$.

13. Simplify.
$3\sqrt{2}\left(6\sqrt{6}-\sqrt{10}\right)-12\sqrt{3}$

14. Determine the roots of the equation $-2x^2+4x+96=0$ by factoring.

15. Use the quadratic formula to determine each of the roots of $12x^2-11x+2=0$ to two decimal places.

16. Determine the number of zeros for the function $f(x)=x^2-3x-5$. (be discriminating!)

17. A certain quadratic function has a *maximum* value of -1.2. How many zeros does the function have?

18. Calculate the discriminant for the function $f(x)=x^2-x+8$. How many times will the graph of the function intersect the x-axis? Explain your answer.

19. For what value(s) of k will the function $h(x)=4x^2-kx+25$ have only one zero? Explain your answer.

20. Neal dropped a small stone off a bridge that is 21 m above the water. The height of the stone is given by the function $h(t)=-4.9t^2+x+21$, where $h(t)$ is the height in metres and t is the time in seconds. How long will it take for the stone to hit the water?

21. Use the quadratic formula to determine each of the roots of $-7x^2-23x=-10$ to two decimal places.

22. Tasha is trying to toss a ball over a wall that is 9.4 m high. The height of the ball is modelled by the function $h(t)=-4.9t^2+10t+1.7$ where $h(t)$ represents the height in metres and t models the time in seconds. Will Tasha be able to toss the ball over the wall? Use the discriminant to explain your answer.

23. Jacqueline threw a ball from 1 m above the ground. The ball reached a maximum height of 46 m at 3 seconds. Determine the equation that will model the parabola for this situation.