

MATH 133 – Calculus with Fundamentals 1  
Practice on Quadratic Functions and Completing the Square  
September 6, 2017

*Background*

Recall that (basic form of) the algebraic method of completing the square gives a way to rewrite any quadratic function  $x^2 + bx + c$  as

$$x^2 + bx + c = (x + r)^2 + s$$

for some constants  $r, s$ . If we have a quadratic function  $ax^2 + bx + c$  with  $a \neq 1$  (but  $a \neq 0$  as well), then we can factor out the  $a$  and apply the basic form of the process.

*Questions*

- 1) For each of the following quadratic functions  $f(x)$ , complete the square, then use that form to generate a sketch of the graph  $y = f(x)$  by shifting and scaling the graph  $y = x^2$ .
  - (a)  $f(x) = x^2 + 4x + 5$
  - (b)  $f(x) = 2x^2 - 5x + 2$
- 2) A ball thrown straight upward with initial velocity 96 ft/sec has height  $y(t) = 96t - 16t^2$  (ft) after  $t$  (sec). What is the maximum height attained by the ball? (Hint: Complete the square in the formula for  $y(t)$  and think similarly to what you did in problem 1.)