

1) Given the function  $f(x) = 2x^3 - 3x^2 - 12x + 20$ .

a) Find the zeros of  $f(x)$ .

b) Write an equation for the normal line to  $f(x)$  that passes through  $x=0$ .

c) Find the  $x$  and  $y$  coordinates of all points on the graph of  $f(x)$  where the tangent line is parallel to  $-24x + 2y - 10 = 0$ .

2) A particle moves on a line away from its initial position along the curve  $s(t) = 2t^2 - t$ .

a) What is the velocity function of the particle?

b) Find the average velocity of the particle over the interval  $[1, 3]$ .

c) Find the instantaneous velocity at  $t=2$ .

3)  $f(x) = x + \frac{5}{x}$

- a) Find the domain of  $f(x)$ .
- b) Find the  $x$  and  $y$  values at which  $f(x)$  has a horizontal tangent line.
- c) Find the  $x$  and  $y$  values where  $f(x)$  has a vertical tangent line. Explain how you got your answer.