

### Differentiation Formulas

1. Differentiate :  $h(t) = 8t^4 + 6\sqrt[4]{t^3} - \frac{1}{3t^{10}} + 2$

2. Find the equation of the tangent line to  $g(x) = \sqrt{x^5}(x^{-4} + \sqrt[3]{x^2})$  at  $x = 1$ .

4. The position function of an object is  $s(t) = 2t^3 - 45t^2 + 264t + 100$  where  $t$  is in seconds and  $s$  is in feet. Assume that the object starts moving at  $t = 0$  and answer the following questions.

(a) What is the velocity of the object at any time  $t$ ?

(b) When, if ever, is the object at rest (*i.e.* not moving)?

(c) When is the object moving to the right and when is it moving to the left?

### Product and Quotient Rule

For problems 6 & 7 use the Product or Quotient Rule to find the derivative.

6.  $h(t) = (2t^2 + t^{-4})(\frac{7}{t} - 3t)$

7.  $W(y) = \frac{y^2 - 3y}{7 - y^2}$

### Derivative of Trig Functions

For problems 9 – 11 differentiate the given function.

9.  $g(t) = 8\sec(t) + t^2 \csc(t)$

10.  $y = \frac{\cot(z)}{6 + \sin(z)}$

11.  $Y(\theta) = \theta^2 - 15\cos(\theta)\sin(\theta)$

6. Two boats start out 1200 miles apart with boat A directly to the west of boat B. At the same time both boats start moving with boat A traveling to the east at 50 mph while boat B travels north at 35 mph. Determine if the distance between the boats is increasing, decreasing or not changing after the following travel times.

(a) 4 hours

(b) 18 hours

(c) 26 hours