

Compute the derivatives of the following functions.

1.  $f(x) = \sqrt{1+x^2}$

2.  $f(\theta) = \tan(4\theta + 9)$

3.  $f(t) = e^{t^2}(1 + \cos(t))$

4.  $f(v) = \sec\left(\frac{1}{1+v^2}\right)$

5. The cost of building wooden pencils is given by a function  $C(n)$  where  $C$  is the cost in dollars and  $n$  is the number of pencils, measured in thousands.

a) Explain what  $C'(50) = 37.5$  means in language your parents could understand.

b) Suppose it costs \$20000 to build 50000 pencils and  $C'(50) = 37.5$ . Estimate the cost of building 51000 pencils.

c) Under the same assumptions, estimate the cost of building 50100 pencils.

6.  $f(x) = \cos(x^{1/3}e^x)$

7.  $f(x) = \sqrt{x + e^{x^2}}$