

### AB Calculus AB 5.5 – Linearization and Differentials Review

1) a) Find the linearization,  $L(x)$ , of  $f(x) = x^3 - 3x^2 + 2x + 1$  at  $x = 2$ .

b) Use  $L(x)$  to estimate  $f(1.98)$ .

c) What is the exact value of  $f(1.98)$ ?

d) What is the approximation error?

2) Consider the function  $y = \ln(x^2 + 2)$

a) find the differential  $dy$

b) Evaluate  $dy$  for  $x = 3$  and  $dx = 0.02$

3) A box has a square base and its height is three times the length of its base edge ( $x$ ), giving the box volume and surface area equations of:

$$V = 3x^3$$

$$SA = 14x^2$$

a) Write a differential formula that estimates the change in volume when  $x$  changes from  $a$  to  $a + dx$

b) Using your formula, what would the change in volume be if  $x$  changes from 10 inches to 10.05 inches?

c) Repeat (a) and (b) for surface area