# Homework 2.5 – Linear Approximation

**1.** **(1 pt) alfredLibrary/AUCI/chapter2/lesson5/leibniz2pet.pg**

**NOTE:** Units are required in the answer blank on the right side of each equal sign. Complete this problem on paper first so you can practice writing Leibniz notation.

The position $s$ (in miles) of a car at time $t$ (in hours) is given by

$$s(t) = -8t^3 - 5t^2 + 5t - 4.$$

(a) The velocity $v$ of the car is given by the formula

___$\frac{\text{_____}}{\text{_____}}$___ = _____

(b) The velocity of the car at time $t = 6.5$ hours is

___$\frac{\text{_____}}{\text{_____}}$___ $\Big|_{t=\text{___}}$ = _____

(c) The acceleration of the car is given by the formula

___$\frac{\text{_____}}{\text{_____}}$___ = _____

(d) The acceleration of the car at 6.5 hours is

___$\frac{\text{_____}}{\text{_____}}$___ $\Big|_{t=\text{___}}$ = _____

**2.** **(1 pt) alfredLibrary/AUCI/chapter2/lesson5/differential2p.pg**

Recall that

$\Delta y = y(x+\Delta x) - y(x)$ and $dy = y'(x)dx$.

Let $y = 2x^2$.

(a) Find $\Delta y$ when $x = 2$ and $\Delta x = 0.4$:

$\Delta y =$ _____

(b) Find the differential $dy$ when $x = 2$ and $dx = 0.4$:

$dy =$ _____

**3.** **(1 pt) alfredLibrary/AUCI/chapter2/lesson5/errorprop2p.pg**

The radius of a circular disk is measured as 24 cm with a maximum error in measurement of $\pm 0.1$ cm. Use differentials to estimate the propagated error and the relative error in the calculated area of the disk.

Propagated error $\approx \pm$ _____ square centimeters

Relative error (as a unitless decimal) $\approx \pm$ _____

**4.** **(1 pt) alfredLibrary/AUCI/chapter2/lesson5/error10pet.pg**

An oil tank in the form of a right circular cylinder of radius of $r$ has a height $h$ of 37 meters and a volume of $V = 37\pi r^2$. The radius is measured as 12 meters with a maximum possible error of $\pm 0.1$ meters. Estimate the propogated and relative errors in the calculated volume of the tank.

Propagated error $\approx \pm$ _____(Your answer requires **units**.)

Relative error (as a percentage) $\approx \pm$ _____