

WED 01-11-06

AP GRN (81) D

(22) THE MAXIMUM VOLUME IS 2418.399cc

WHEN THE RADIUS IS 8.165cm

AND THE HEIGHT IS 11.457cm

$$g) 3(x^2 - 6x + 7) = 0$$

~~$$3(x - 7)(x - 1) = 0$$~~

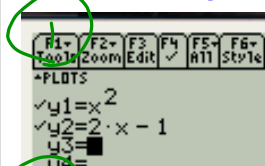
4.5 LINEARIZATION

Ex) $f(x) = x^2$

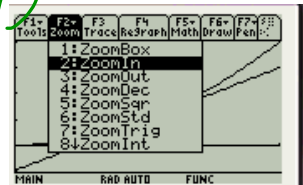
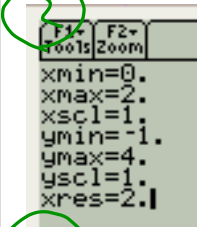
FIND THE EQ. OF tangent line to

$f(x)$ AT $x=1$.

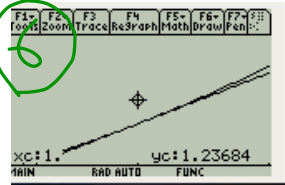
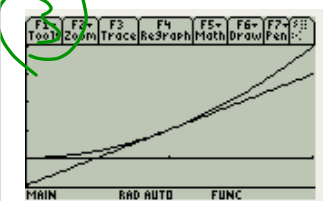
Soln: $y = 2x - 1$



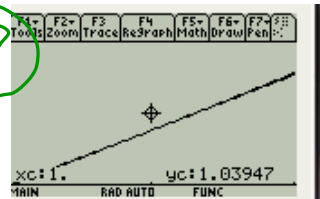
4



5



7





9

F1 Tools	F2 Setup	F3 D.13	F4 D.14	F5 D.15	F6 D.16	F7 D.17
x	u1	u2				
.98	.9604	.96				
.99	.9801	.98				
1.	1.	1.				
1.01	1.0201	1.02				
1.02	1.0404	1.04				
x = .98						

MAIN RAD AUTO FUNC

REVIEW: EQS. OF LINES

☺ STANDARD FORM: $Ax + By = C$

☺ SLOPE-INT FORM: $y = mx + b$

☺ POINT-SLOPE FORM $m = \frac{y - y_1}{x - x_1}$

GIVEN: $P_1: (x_1, y_1)$
SLOPE = m } $y - y_1 = m(x - x_1)$

Ex) $P: (7, -2); m = 4$

Eq: $y - (-2) = 4(x - 7)$

or $y + 2 = 4(x - 7)$

GENERALIZE: POINT: (x_1, y_1)

PT.-SLOPE FORM: $x_1 = a$
 $y_1 = f(a)$

$y - y_1 = m(x - x_1)$

$m = ? f'(a)$

$y - f(a) = f'(a)(x - a)$

$y = f(a) + f'(a)(x - a) = L(x)$

THE LINEARIZATION
OF $f(x)$ AT
 $x = a$

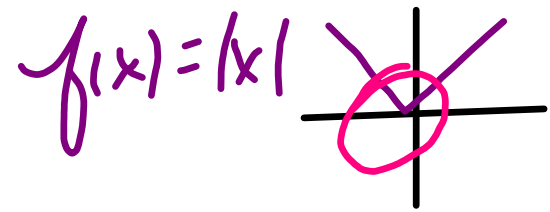
* f MUST BE DIFF. AT $x = a$.

DIFFERENTIABILITY \Rightarrow CONTINUITY.
(TRUE)

CONTINUITY \Rightarrow DIFFERENTIABLE

FALSE!

COUNTEREXAMPLE:



"HUH?"

Ex) FIND THE LINEARIZATION OF

$$f(x) = \sqrt{1+x} \quad \text{AT: a) } x=0; \text{ b) } x=3$$

$$\text{a) } L(x) = f(a) + f'(a)(x-a)$$

$$f(a) = f(0) = \sqrt{1} = 1$$

$$f'(x) = \frac{1}{2}(1+x)^{-\frac{1}{2}} \cdot 1 = \frac{1}{2\sqrt{x+1}}$$

$$f'(x=0) = \frac{1}{2}$$

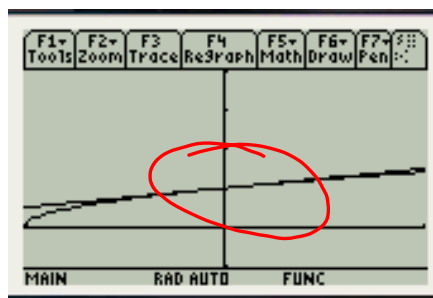
$$L(x) = 1 + \frac{1}{2}(x-0)$$

$$\text{a) } L(x) = 1 + \frac{1}{2}x$$

GOOD. BUT WHAT DOES THIS MEAN? AROUND $x=0$, $L(x) \approx f(x)$

```
F1+ F2+ F3+ F4+ F5+ F6+
Tools Zoom Edit ✓ All Styl
+PLOTS
√y1=(1+x)·.5
√y2=1+.5·x
y3=
```

```
F1+ F2+
Tools Zoom
xmin=-1.
xmax=1.
xscl=1.
ymin=-1.
ymax=4.
yscl=1.
xres=2.
```



$$b) f(x) = \sqrt{1+x} \quad \text{AT } x=3$$

$$L(x) = f(a) + f'(a) \cdot (x-a)$$

$$f(a) = f(3) = 2$$

$$f'(a) = f'(3) = \frac{1}{4}$$

$$x-a = x-3$$

$$L(x) = 2 + \frac{1}{4}(x-3)$$

$$L(x) = 2 + \frac{1}{4}x - \frac{3}{4}$$

$$L(x) = \frac{1}{4}x + \frac{5}{4} \quad \text{SLOPE-INT.}$$

O.T.L.

- ☺ FINISH CORRECTING PROBLEMS IN 4.4
- ☺ GIFT 4.4 #4
- ☺ AP GEN 83, 87, 89
- ☺ BEGIN GROUP PROBLEMS