FRI 12-09-05

AP PINK (16) E

ANTIDERIVATIVE

P. 192

(26) $f'(x) = 2$

$f(x) = 2x + C$; C IS A CONSTANT REAL #

(28) $f'(x) = \sin x$

$f(x) = -\cos x + C$

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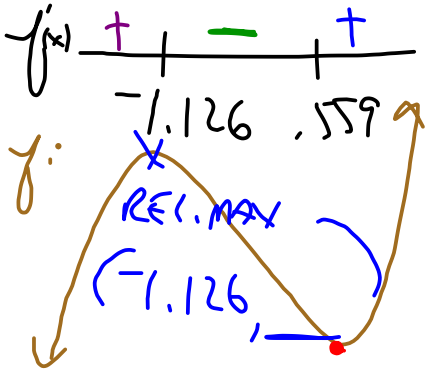
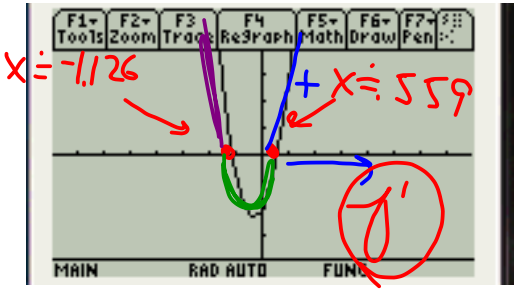
(13) $f(x) = x^3 - 2x - 2\cos x$

$f'(x) = 3x^2 - 2 + 2\sin x = 0$





REL. MN. (.559, ___)

b) INC: $x < -1.126; x > .559$

c) DEC $-1.126 < x < .559$

9) $f(x) = x(4-x)^{\frac{1}{2}}$

$f'(x) = x \cdot \frac{1}{2}(4-x)^{-\frac{1}{2}} \cdot -1 + 1 \cdot (4-x)^{\frac{1}{2}}$

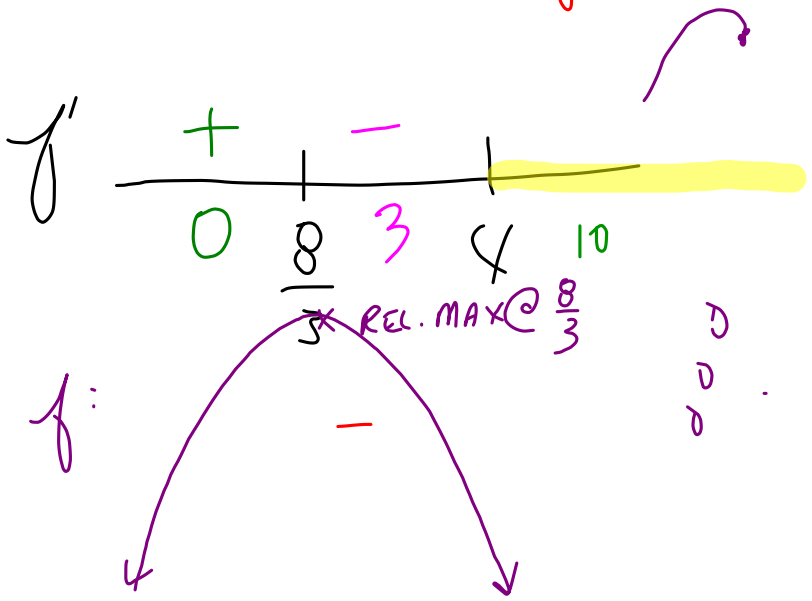
$f'(x) = \frac{-x}{2\sqrt{4-x}} + \frac{\sqrt{4-x}\,2\sqrt{4-x}}{2\sqrt{4-x}}$

$f'(x) = \frac{-x+2(4-x)}{2\sqrt{4-x}}$

$f'(x) = \frac{-3x+8}{2\sqrt{4-x}}$

1) $f' = 0$? $x = \frac{8}{3}$

2) f' UND $x = 4$



THE MEAN VALUE THEOREM (MVT)

IF $y = f(x)$ IS CONTINUOUS AT EVERY POINT OF THE CLOSED INTERVAL $[a, b]$ AND DIFFERENTIABLE AT EVERY POINT OF ITS INTERIOR (a, b), THEN THERE IS AT LEAST ONE POINT c IN (a, b) AT WHICH:

m tan → $f'(c) = \dfrac{f(b) - f(a)}{b - a}$ ← m sec

IN ENGLISH: THERE EXISTS A #, c, IN (a, b) SUCH THAT THE SLOPE OF THE TANGENT LINE AT $x = c$ IS THE SAME AS THE SLOPE OF THE SECANT LINE JOINING THE ENDPOINTS OF THE INTERVAL.

tan line ∥ sec line are parallel

NOTE: THE MVT IS AN EXISTENCE THEOREM.

Ex) a) SHOW THAT THE FUNCTION $f(x) = x^3$ SATISFIES THE HYPOTHESIS OF THE M.V.T. ON $[0, 2]$.

SOLUTION: i) $f(x) = x^3$ IS CONTINUOUS ON $[0, 2]$

ii) $f(x) = x^3$ IS DIFF. ON $(0, 2)$

b) FIND c.

SOLN:

$f'(x) = 3x^2$

$f'(c) = 3c^2$

$\frac{f(b) - f(a)}{b - a} = \frac{8 - 0}{2 - 0}$

$= 4$

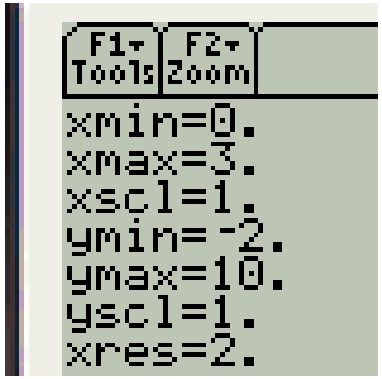
$f'(c) = \frac{f(b) - f(a)}{b - a}$

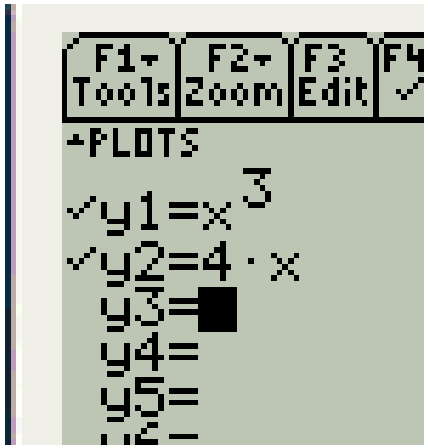
$3c^2 = 4$

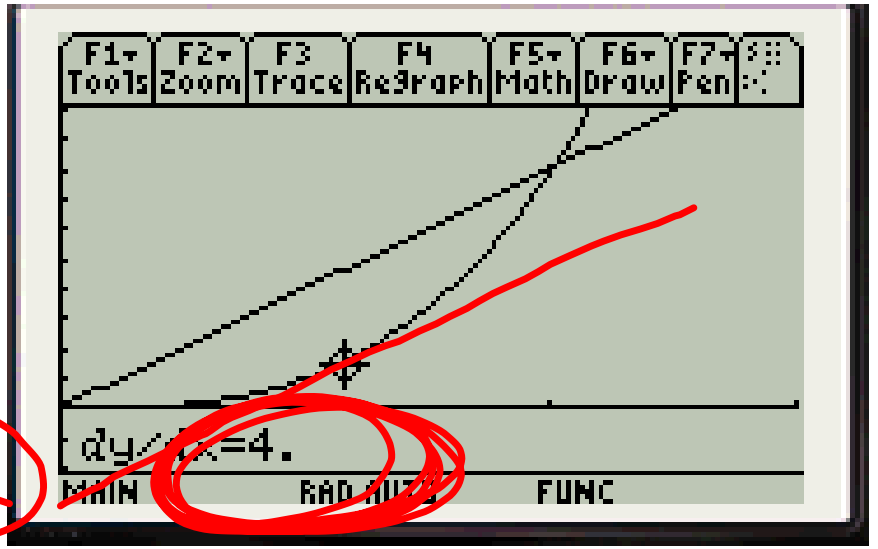
$c^2 = \frac{4}{3}$

$c = \pm\sqrt{\frac{4}{3}}$

$c = \pm\sqrt{\frac{4}{3}}$ or $\frac{2\sqrt{3}}{3}$

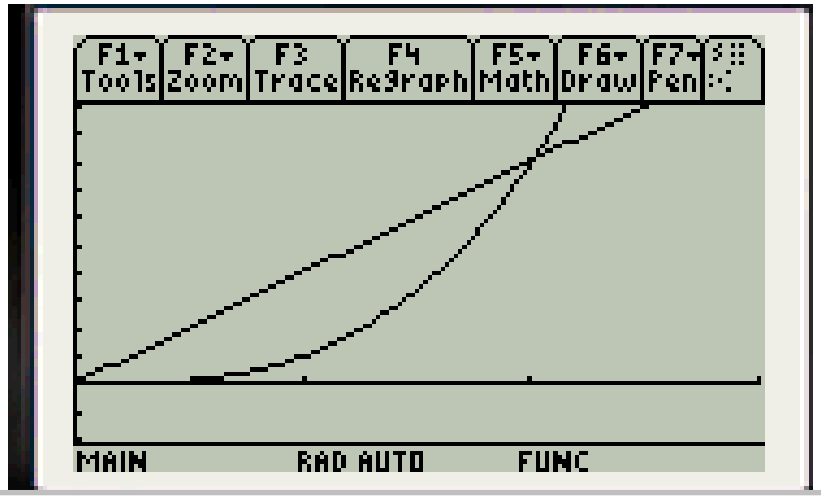






PARALLEL

$m_{tan} = m_{sec} = 4$



O.T.L.

- READ p. 181-191
- P. 192 15, 17, 25, 27, 29, 31
- AP PINK 18