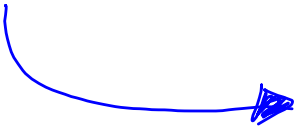
No warm up

HW TALLY



Later in the period

- ✓ you will get your test back
- ✓ There will be an LCQ on some calculus basics so far.

Questions on HW ?

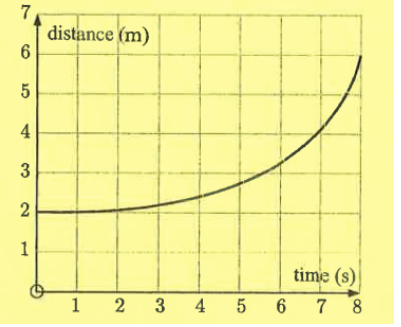
EXERCISE 20A.2

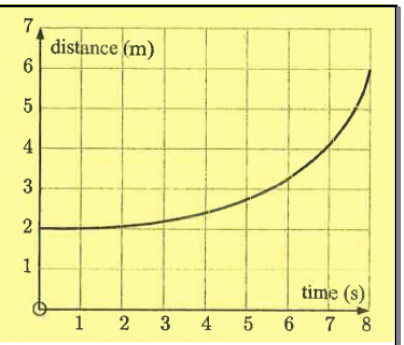
1 For the travel graph given alongside, estimate the average speed:

a in the first 4 seconds

b in the last 4 seconds

c in the 8 second interval.





EXERCISE 20A.2

1 a $0.1\ \text{m s}^{-1}$ b $0.9\ \text{m s}^{-1}$ c $0.5\ \text{m s}^{-1}$

$$f(x) = \frac{2x}{x^2} - \frac{3}{x^2}$$

1e) $4-2x^2$

$f'(x) =$

(g) $5x^4 - 6x^2$

$f'(x) =$

(h) $x^3 + 3x^2 + 4x - 1$

$f'(x) =$

7 $y = 4x - \frac{3}{x}$

$\frac{dy}{dx} =$

interpretation

p. 573 4e $y = \frac{x^2 - 4}{x^2}$ find gradient at $x = 4$

$y = \frac{x^2}{x^2} - \frac{4}{x^2} = 1 - x^{-2}$

$\frac{dy}{dx} =$

NOTES

Review Question:

If $f(x) = x^3 - 2x$ find $f(-2)$ and $f'(-2)$ and interpret each.

$f(-2) = (-2)^3 - 2(-2)$

$= -8 + 4$

$= -4$

$(-2, -4)$

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

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

$= 10$

Check on calculator

$f(-2) = (-2)^3 - 2(-2) = -4$ $(-2, -4)$ point on graph

gradient function $f'(x) = 3x^2 - 2$

gradient at x=-2 $f'(-2) = 3(-2)^2 - 2 = 10$

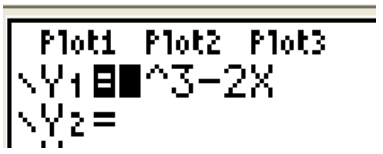
$f(-2) = (-2)^3 - 2(-2) = -4$ $\therefore$ $(-2, -4)$ is the point of tangency on the curve

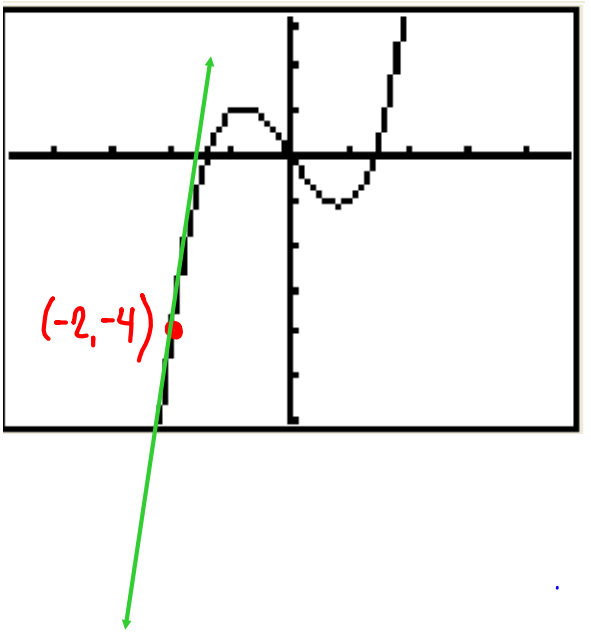
gradient function $f'(x) = 3x^2 - 2$

gradient at x=-2 $f'(-2) = 3(-2)^2 - 2 = 10$

Interpretation: 10 is the slope (gradient) of the tangent at the point oftangency $(-2, -4)$

10 is the instantaneous rate of change at or at $x = -2$



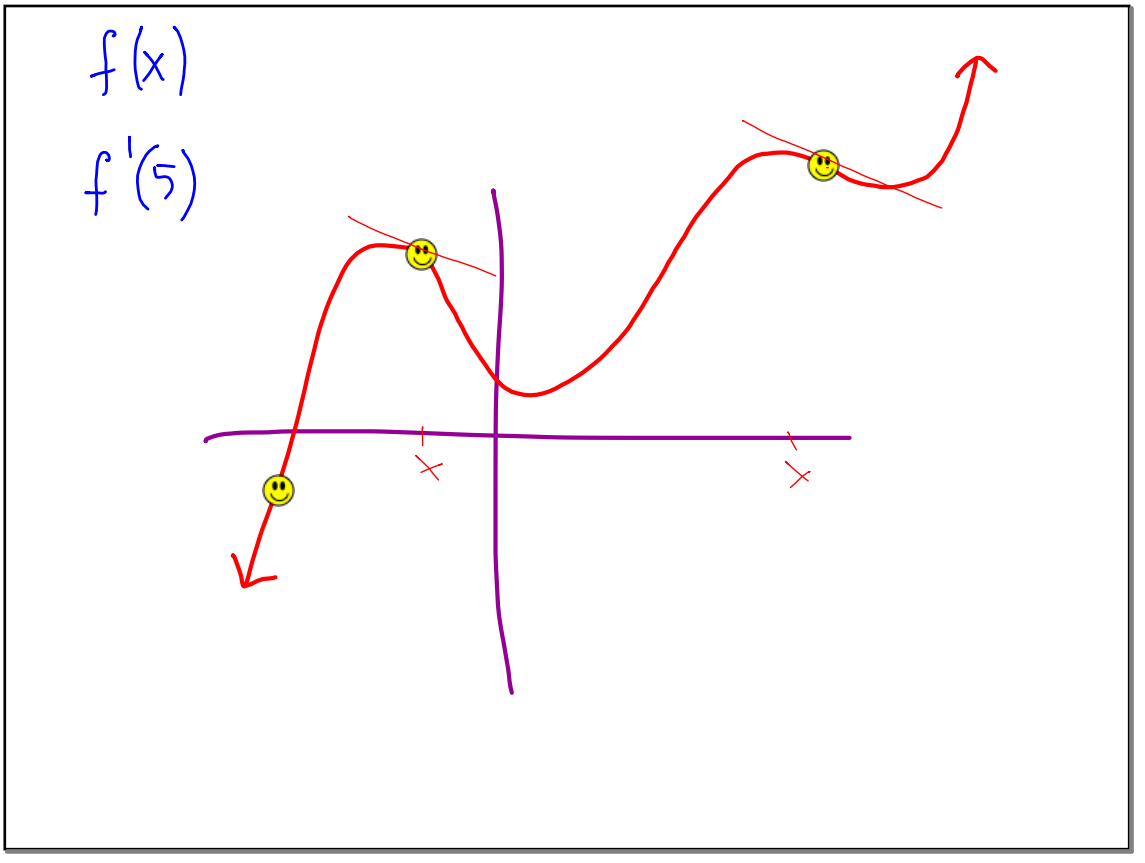


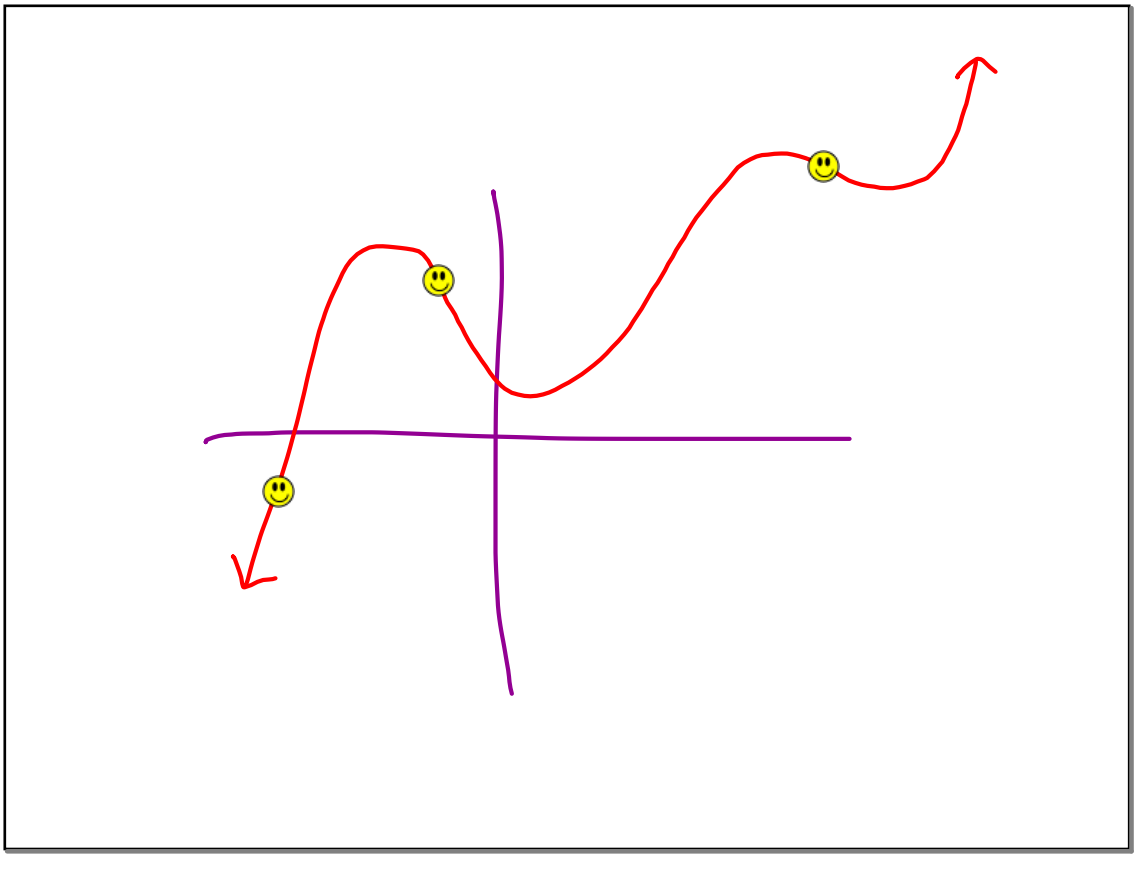
Calculus Day 3 Objectives

1. Find points on curves that have specific gradients.

2. Find the <u>equation</u> of a tangent line at a specific points on a graph.

Need Notes 3.0


f(x)
f'(5)



Example A

At what point on the graph of $y = 3x^2 - 2x + 6$ does the tangent have a gradient of 10

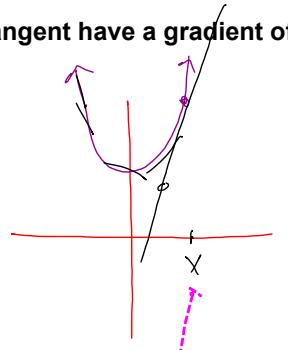
a) find derivative (it tells us all gradients)

$f'(x) = 6x - 2$

$10 = 6x - 2$

$12 = 6x$

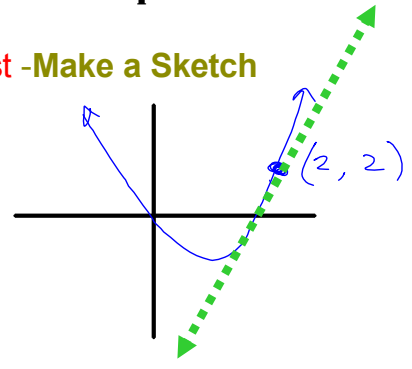
$x = 2$



Example 1

Find the equation of the tangent (line) to $f(x) = 2x^2 - 3x$ at $x = 2$

1st -Make a Sketch



2nd - Find the point of tangency on the original curve

POT (2, 2)

$2(2)^2 - 3(2) = 2$

3rd-Find the gradient of the tangent at x=2

POT (2,2)

$f'(x) = 4x - 3$

$f'(2) = 4(2) - 3 = 5$

4th-Using your point & slope, write the equation

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

$y - 2 = 5(x - 2)$

$y - 2 = 5x - 10$

$y = 5x - 8$

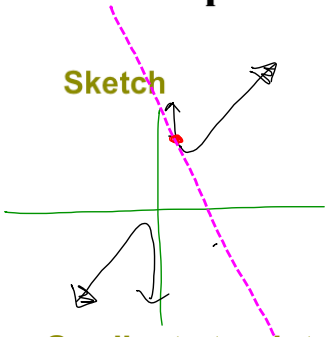
5th-Check using GDC

Example 2

Find the equation of the tangent to $f(x) = 5x^{-1} + x$ **at** $x = 1$

$= \frac{5}{x} + x$

Sketch



Point of tangency

POT $(1, 6)$

Gradient at point of tangency

$f(x) = 5x^{-1} + x^1$

$f'(x) = 5(-1)x^{-2} + 1$

$f'(x) = -5x^{-2} + 1$

$= -\frac{5}{x^2} + 1$

$f'(1)$

$= \frac{-5}{1^2} + 1$

$= -4$

Equation

$y - 6 = -4(x - 1)$

Your calculator can "draw" tangent anywhere you wish.

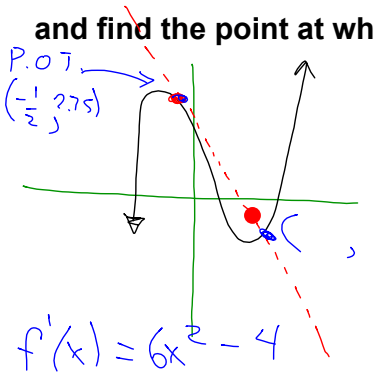
At the same time, the equation will be given.

which is a great way to check your answer.

Example 3

Find the equation of the tangent to $f(x)=2x^3-4x+1$ **at** $x=-\frac{1}{2}$

and find the point at which this tangent meets the curve again.



$f'(x)=6x^2-4$

$f'(-\frac{1}{2})=6(-\frac{1}{2})^2-4=-2.5$

$y-2.75=-2.5(x+.5)$

$y-2.75=-2.5x-1.25$

$+2.75 \quad +2.75$

$y=-2.5x+1.5$

I $(1,-1)$

Brain Break

Take an LCQ while I pass your last Test back

(you'll need a ruler of some kind)

Assignment

Calculus Packet:

pdf ↓ mr.c

page. 574.... 5

page 575.... 10, 12, 14

page 578..... 1de, 2b