- Final Exam

  Monday, May 3 , 8:00 – 10:30 AM

On WileyPlus

- Use HW, Sample Test, past midterms and notes to categorize the problems.
- Practice at least 1-2 problems from each category.

  When you attempt for the first time, don't look at the solutions.

  After attempting, look at the solutions.

- HW's still open

  I can reopen any HW
- I will post a copy of Midterm 1 on moodle.
- If you want to send me scratch work, send it as soon as you finish the exam.

I made the categories for Midterm 4. You can add any new categories from the exam on Tuesday.

Midterm 2

covers 2.1, 2.2, 2.3, 2.4, 2.5

covers HW 4, 5, 6

Category 1

Given: Graph of $f(x)$

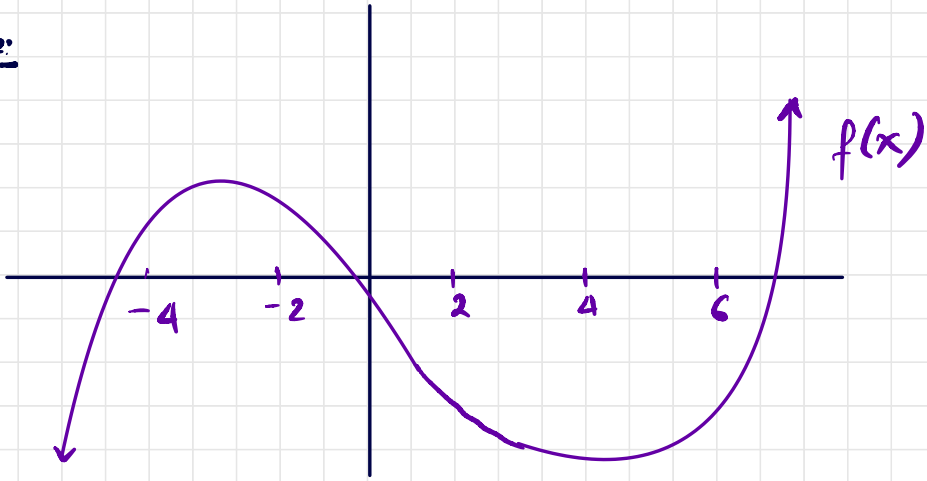
want: $f(\_)$ is positive / negative

$f'(\_)$ is positive / negative.

Problems:

i) 2.1 #1 (HW 4)

Example:



Is $f(2)$ is positive ✓
negative

$f'(6)$ is positive ✓
negative

$f'(-2)$ is positive
negative ✓

Category 2

Given: i) $f'(-) > 0$ or $f'(-) < 0$

Want: Select the correct graph of $f(x)$ (Multiple Choice)

Problems:

i) 2.1 # 5, # 6 (HW 4)

ii) 2.1 # 3, # 4

Category 3

Given: i) Formula for distance function $s(t)$

Want: Average velocity from $t =$ __ to $t =$ __

Problems:

i) 2.1 # 12 (HW 4)

ii) 2.1 # 11

2.1 #12.

$$s = 5t^2 + 4$$

a) Find the avg. velocity between $t=1$ and $t=1+h$ if $h = 0.1$

Soln.

Avg. velocity from $t=a$ to $t=b$ $= \dfrac{s(b) - s(a)}{b - a}$

Avg. velocity from $t=1$ to $t=1.1$ $= \dfrac{s(1.1) - s(1)}{1.1 - 1}$

$$= \frac{5(1.1)^2 + 4 - (5 \cdot 1^2 + 4)}{0.1}$$

$$= \frac{1.05}{0.1}$$

$$= \boxed{10.5}$$

Category 4

Given: $f(x) =$ ____ formula

Want: $f'($ ____ $)$ estimate

some number

Problems

2.1 # 18 (HW 4)

2.1 # 19

2.1 #18

$g(x) = 4^x$

Use small intervals to estimate $g'(1)$.

Soln.

$\Delta x = 0.001$

$$g'(1) \approx \frac{g(1+\Delta x) - g(1)}{\Delta x}$$

$$= \frac{g(1.001) - g(1)}{0.001}$$

$$= \frac{4^{1.001} - 4^1}{0.001}$$

$$= \boxed{3005.55}$$

Category 5

Given: i) graph of $f(x)$ and tangent line

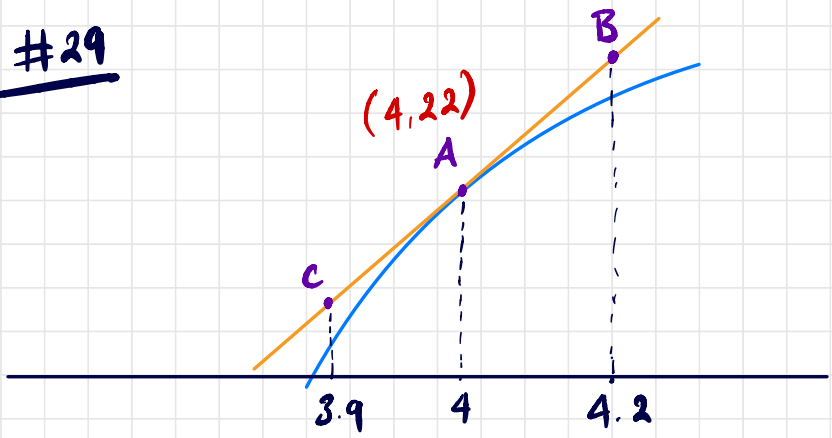
ii) $f(\bigstar) =$

iii) $f'(\bigstar) =$

Want: coordinates of the three points on the tangent line.

Problems: i) 2.1 # 29 (HW 4)

2.1 #29



$f(4) = 22$, $f'(4) = 3.1$. Find coordinates of A, B, C.

Soln. $A = (4, 22)$

Point slope form:

$$y - y_0 = m(x - x_0)$$

$$y - 22 = 3.1(x - 4)$$

$$y - 22 = 3.1x - 12.4$$

$$y = 3.1x + 9.6 \quad \star$$

↑ eqn. of tangent line.

B:

Plug in $x = 4.2$ into $\star$

$$y = (3.1)(4.2) + 9.6$$

$$= 22.62$$

$B = (4.2, 22.62)$

A:

Complete it

Variation

Given: i) Graph of $f(x)$ and tangent line

ii) Two points on tangent line.

Want: $f(\underline{\star}) = ?$

$f'(\underline{\star}) = ?$

Problems: i) 2.1 # 30

ii) Review Exercise #6 (HW 4)

Category 6 Given: Graph of $f(x)$

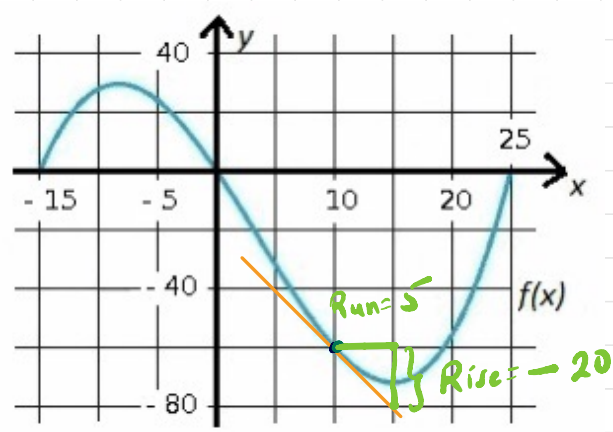
Want: Estimate $f'(\_)$, $f'(\_)$, - -

by drawing tangent lines

Problems: i) 2.2 # 1 (HW 5)

ii) 2.2 # 2

Example:



Estimate $f'(10)$

Soln. Slope of tangent line $= \frac{\text{Rise}}{\text{Run}}$

$$= \frac{-20}{5}$$

$$= \boxed{-4}$$

$\therefore \quad f'(10) \approx -4.$

Category 7

Given: graph of $f(x)$

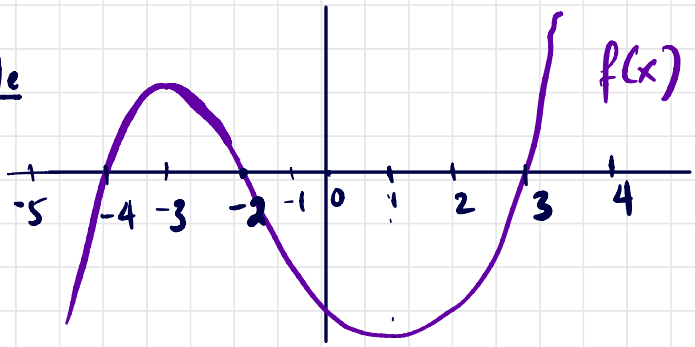
Want: Select correct graph of $f'(x)$ (Multiple choice)

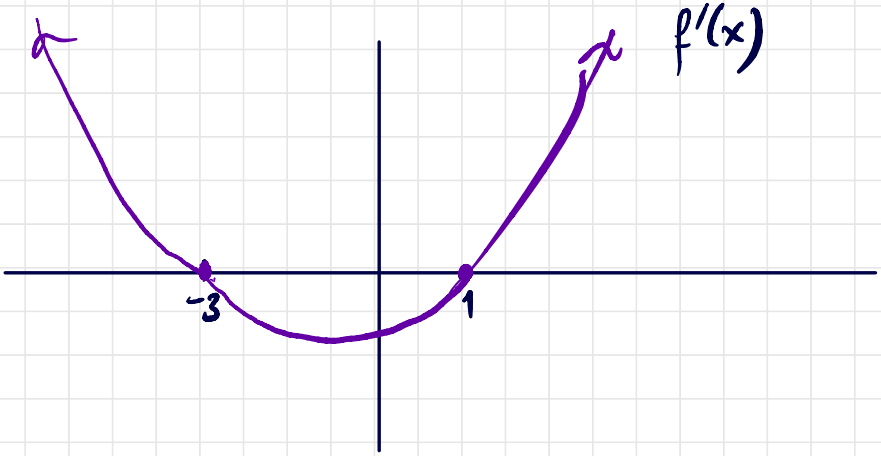
Problems:

i) 2.2 #5, #7 (HW 5)

ii) 2.2 # 3, 4, 6, 8

Example





Category 8

Given: Graph of $f'(x)$

Want: Select correct graph of $f(x)$ (multiple choice)

Problems

i) 2.2 # 22 (HW5)

ii) 2.2 # 24 (HW5)

iii) 2.2 # 23, 25

Category 9

Given: $f(\bigstar) = \_\_$

$f'(\bigstar) = \_\_$

Want: Estimate $f(\_\_)$, $f(\_\_)$, ...

Problems

i) 2.3 # 29 (HW5)

ii) 2.3 # 30

iii) 2.3 # 31 - 36

SAME AS CATEGORY 5

Category 10

Given: Graphs of $f(x)$ and $g(x)$

Want: At $x =$ ___ which function has greater rate?

Problems

1) 2.3 # 51 (HW 5)

Category 11

Given: $f(t) =$ ___ ← some formula

Want: Relative rate of change at $t =$ ___ using $\Delta t =$ ___

Problems

i) 2.3 # 63 (HW 5)

ii) 2.3 # 64, 65.

Category 12

Given: Graph of $f(x)$

Want: $f'(-)$ is positive / negative

$f''(-)$ is positive / negative

Problems

i) 2.4 #1, 2, 7, 8 (HW 6)

ii) 2.4 #9

Category 13

Given: Graph of $f(x)$

Want: i) Intervals where derivative is positive

" " " " negative

ii) Intervals where second derivative is positive.

" " " " negative.

Problems

i) 2.4 # 13 (HW 6)

14

Category 14

Given: Graph of revenue $R(q)$ or cost $C(q)$

Want: Estimate Marginal revenue MR or Marginal cost MC at $q =$ ___

Problems: 2.5 #3 (HW 6) ~~#5~~

SAME AS CATEGORY 6

Category 15

Given: $C(\bigstar) = \_\_$

$R(\bigstar) = \_\_$

$MC(\bigstar) = \_\_$

$MR(\bigstar) \_\_$

Want: i) Profit at $\bigstar$ =

ii) If production increases by 1 unit, how much does profit change?

Problems: i) 2.5 #6 (HW 6)

ii) Sample Test 2B #10

Category 16

Given: $C(\underline{\bigstar}) = \_\_$

$C'(\underline{\bigstar}) = \_\_$

Want: $C(\_), C(\_), \ldots$

Problems

1) 2.5 # 11 (HW 6)

2) Sample Test 2B # 11

SAME AS CATEGORY 9

WHICH IS THE SAME AS

CATEGORY 5