MATH 142 (SUMMER '21, SESH A2)

ANURAG SAHAY

OFF HRS: M, F 4-5PM;
BY APPOINTMENT

LECTURES:
5:45 PM - 7:50 PM (ET)
M, T, W, R

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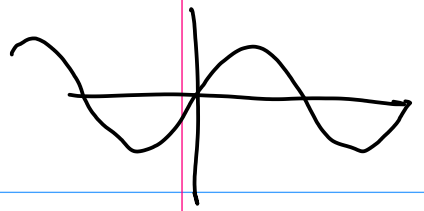
ANNOUNCEMENTS

1. WEBWORK DEADLINES: (a) WW 4 → FRIDAY
   (b) WW 5 → MONDAY? (TO BE RELEASED)

2. EXAM ON MONDAY (IN CLASS, TILL §5.4)
3. EXAM REVIEW TODAY
4. WEBWORK SOLUTIONS SOON.

PLAN FOR TODAY

1. REVIEW SHEET
2. SAMPLE MIDTERM
3. QUESTIONS (FROM WW, THEORY, PRACTICE EXAMS)
4. LECTURE (IF TIME PERMITS)



EVEN	$f(-x) = f(x)$
ODD	$f(-x) = -f(x)$
PERIODIC	$f(x+P) = f(x)$

SAMPLE MIDTERM

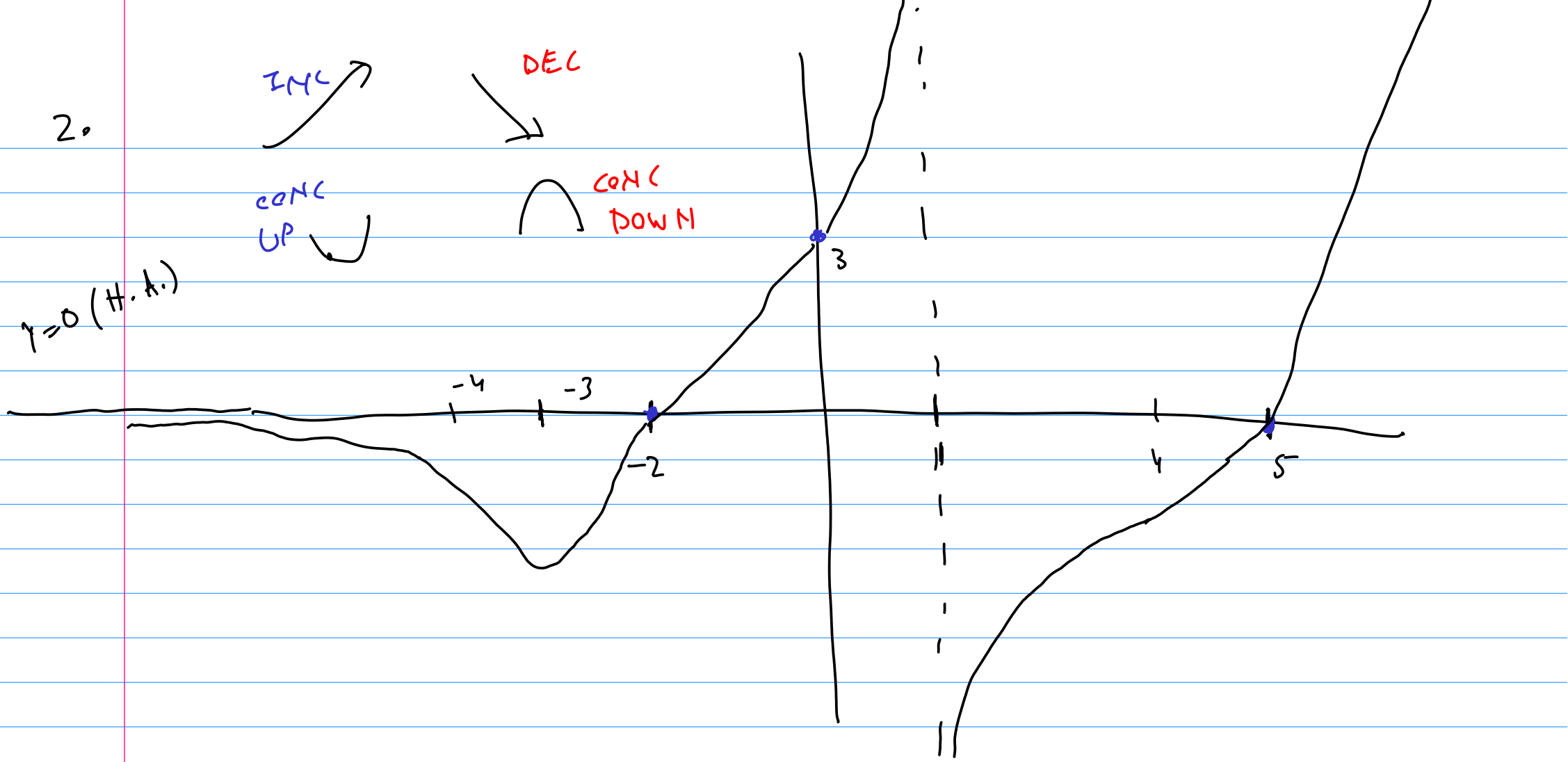
1. (b) $f(x) = \dfrac{e^{x^2}}{\sin x} - \dfrac{x}{\ln x}$

$x \longrightarrow -x$

$$f(-x) = \frac{e^{(-x)^2}}{\sin(-x)} - \frac{(-x)}{\ln(-x)}$$

$$= -\left[\frac{e^{x^2}}{(\sin x)} - \frac{x}{\ln x}\right] = -f(x)$$

2.



BREAK TILL

6:48 PM (EST)

$$v(t) = t^2 - 6t + 5$$

(a) DISLACEMENT b/w $t=3$ & $t=6$

(b) DISTANCE b/w $t=3$ & $t=6$

$$\text{DISP} = \int_a^b v(t)\,dt \qquad \left[\text{NET CHANGE THEOREM}\right]$$

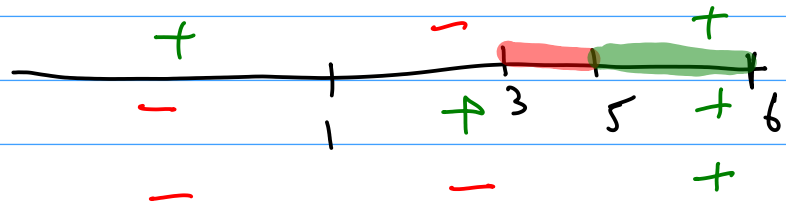
$$= \int_3^6 \left(t^2 - 6t + 5\right) dt = \frac{t^3}{3} - \frac{6t^2}{2} + 5t \Big]_3^6$$

DISTANCE $= \int_a^b |v(t)|\,dt$ $\quad b=6$ $\quad a=3$

$(5,6)$? $v(t) > 0$

$(3,5)$? $v(t) < 0$

$v(t) = (t-1)(t-5)$



$v(t) = t^2 - 6t + 5 = (t-5)(t-1)$

$t=1,\ t=5$

$$\int_3^6 |v(t)|\,dt = \int_3^5 |v(t)|\,dt + \int_5^6 |v(t)|\,dt = \int_3^5 (-v(t))\,dt + \int_5^6 v(t)\,dt$$

$$\int t^n \, dt = \frac{t^{n+1}}{n+1} + C$$

$$|x| = \begin{cases} +x & x > 0 \\ -x & x < 0 \end{cases}$$

$$\int_3^5 -\left(t^2 - 6t + 5\right) dt + \int_5^6 +\left(t^2 - 6t + 5\right) dt$$

$$= \left[-\frac{t^3}{3} + \frac{6t^2}{2} - 5t\right]_3^5 + \left[\frac{t^3}{3} - \frac{6t^2}{2} + 5t\right]_5^6$$

$$= -\frac{5^3}{3} + \frac{6 \times 5^2}{2} - 5 \times 5 - \left[-\frac{3^3}{3} + \frac{6 \times 3^2}{2} - 5 \times 3\right] + \left[\frac{6^3}{3} - \frac{6 \times 6^2}{2} + 5 \times 6\right] - \left[\frac{5^3}{3} - \frac{6 \times 5^2}{2} + 5 \times 5\right]$$

$$\frac{d}{dx}\int_1^{\ln x}\frac{1}{t^2}\,dt \longrightarrow \frac{d}{dx}\,g(\ln x)$$

$$\frac{d}{dx}\int_a^{x} f(t)\,dt = f(x)$$

$$\frac{d}{dx}\int_1^{x} f(t)\,dt$$

$$g(x) = \int_1^{x}\frac{1}{t^2}\,dt$$

$$g(\ln x) = \int_1^{\ln x}\frac{1}{t^2}\,dt$$

$$\Rightarrow g'(x) = 1/x^2$$

$$\frac{d}{dx}\, g(\ln x)$$

$$u = \ln x \implies \frac{du}{dx} = \frac{1}{x}$$

$$\frac{d}{dx}\, g(u) = \frac{du}{dx} \cdot \frac{d}{du}\left(g(u)\right)$$

$$= \frac{du}{dx} \cdot g'(u)$$

$$= \frac{1}{x} \cdot g'(u) = \frac{1}{x} \cdot \frac{1}{u^2} = \frac{1}{x\,(\ln x)^2}$$