

Tuesday, November 13

- return TEST #3
- hand out QUIZ #2 (due 11/15)
- finish 4.5: (integr. using SUBST.)
- begin 5.1: (consumer surplus; producer surplus)

4.5: (integr. using SUBST.) $u = x^2 + x + 1$

$x=4$
 $x=1$

$$\frac{2x+1}{x^2+x+1} dx = \ln 7$$

$x=4 \longrightarrow u=21$
 $x=1 \longrightarrow u=3$

let $u = x^2 + x + 1$
 $du = (2x+1)dx$

$$\int_3^{21} \frac{du}{u} = \int_3^{21} \frac{1}{u} \cdot du = \ln|u| \Big|_3^{21}$$

$\ln\left(\frac{a}{b}\right) = \ln(a) - \ln(b)$

$$= \ln(21) - \ln(3)$$

$$= \ln\left(\frac{21}{3}\right) = \ln 7$$

$$\int \frac{du}{u} = \int \frac{1}{u} du = \ln|u|$$

(2)

$$= \ln|x^2+x+1|$$

$$= \ln|4^2+4+1| - \ln|1^2+1+1|$$

$$= \ln(21) - \ln(3)$$

$$= \ln\left(\frac{21}{3}\right) = \ln 7$$

$$\int \frac{(\ln x)^3}{x} dx = \int (\ln x)^3 \cdot \frac{1}{x} dx$$

$$\text{let } u = \ln x$$

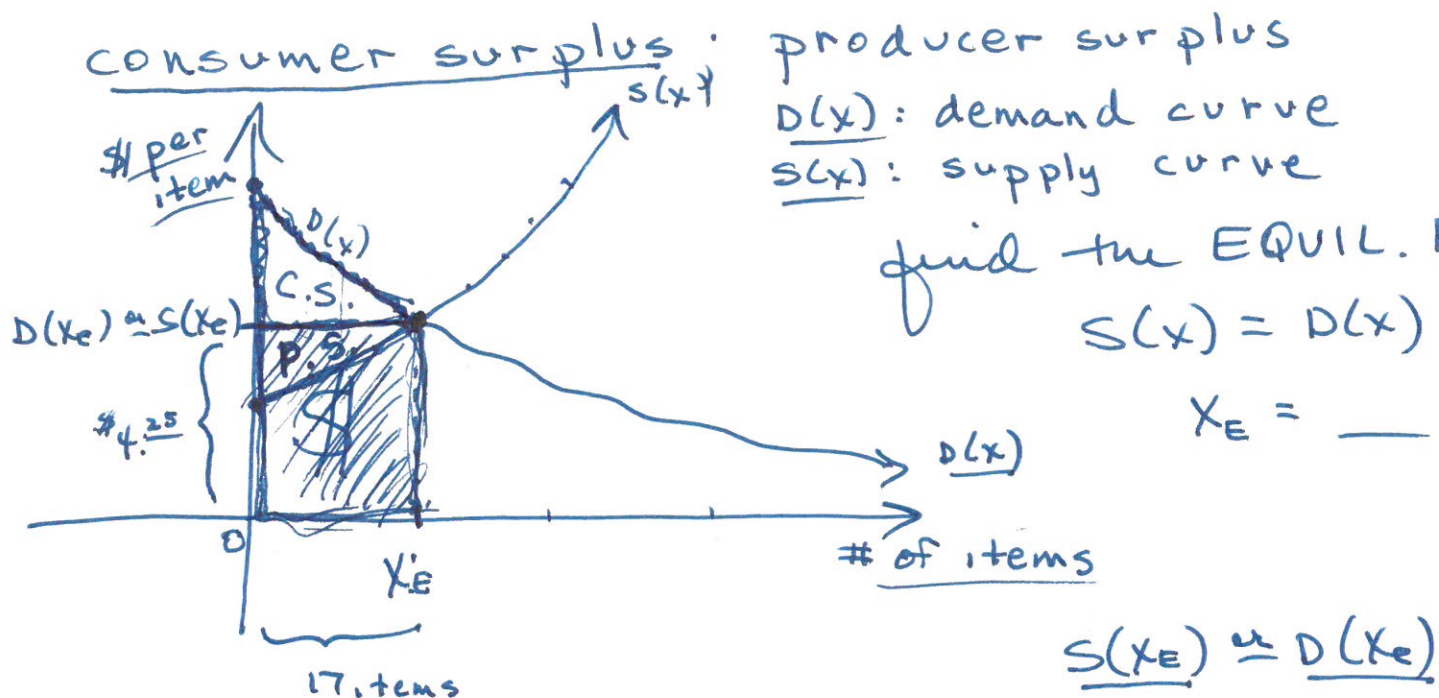
$$du = \frac{1}{x} dx$$

$$\int u^3 \cdot du = \frac{u^4}{4} + C$$

$$= \frac{(\ln x)^4}{4} + C$$

check: $d\left(\frac{(\ln x)^4}{4} + C\right) \stackrel{??}{=} \frac{(\ln x)^3}{x}$

S.1: APPLICATIONS OF INTEGRATION



(17 items) (4.25 \$/item)
 $\$ = \$ \underline{\hspace{2cm}}$

consumer surplus:

C.S. = $\int_0^{x_E} D(x) dx - (\text{money box})$

cons. surplus: a sense or feeling that "you got more than you paid for"

producer surplus:

P.S. = $(\text{money box}) - \int_0^{x_E} S(x) dx$

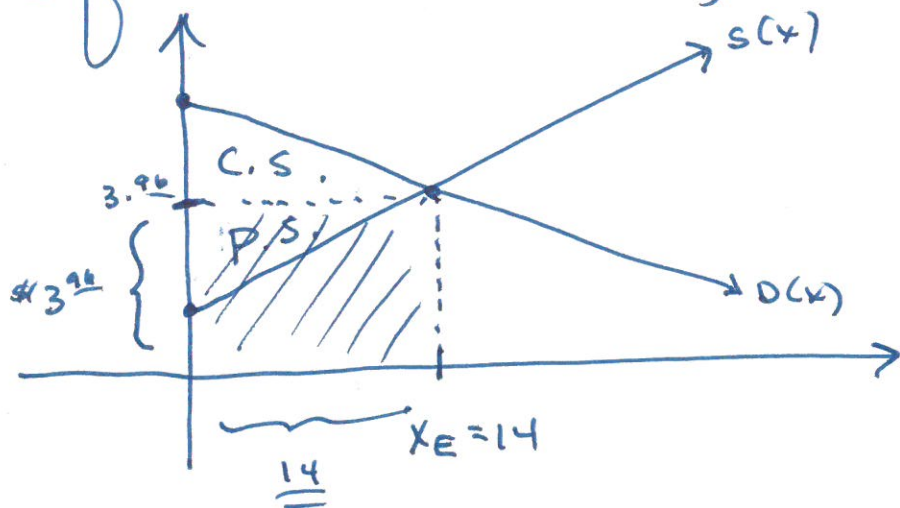
prod. surpl: real \$; a contribution (part of) the REVENUE for the seller; maybe part of the PROFIT.

(4)

$$D(x) = -\underline{.36}x + \underline{9}$$

$$S(x) = \underline{.14}x + \underline{2}$$

find the EQ. PT; C.S., and P.S.



EQ. PT:

$$D(x) = S(x)$$

$$-\cancel{.36}x + 9 = .14x + 2$$

$$+\cancel{.36}x - 2 + .36x - 2$$

$$\frac{7}{.5} = \frac{.8x}{.8}$$

$$x = 14$$

money box:

$$(14) (\$3.96) = \$55.44$$

$$S(14) = .14(14) + 2$$

$$S(14) = 1.96 + 2$$

$$S(14) = \$3.96$$

$$C.S. = \int_0^{14} (-.36x + 9) dx - (\$55.44)$$

$$C.S. = \left[-\frac{.36x^2}{2} + 9x \right]_0^{14} - \$55.44$$

$$= \left(\frac{-.36}{2} (14)^2 + 9(14) \right) - \$55.44$$

$$= \$90.72 - \$55.44$$

$$C.S. = \underline{\underline{\$35.28}}$$

$$\begin{aligned}
 P.S. &= (\text{money box}) - \int_0^{14} (.14x + 2) dx \\
 &= (\$55.\overline{44}) - \left[\frac{.14x^2}{2} + 2x \right]_0^{14} \\
 &= \$55.\overline{44} - \left[\frac{.14(14)^2}{2} + 2(14) \right] \\
 &= \$55.\overline{44} - \underline{\hspace{2cm}}
 \end{aligned}$$

$$P.S. = \underline{\$13.\overline{72}}$$

Name _____ Row _____ Seat _____

NORTH CAROLINA STATE UNIVERSITY

Department of Mathematics

MA121-002 Quiz #2 Due Thursday, November 15 (at the beginning of class) J. Griggs

Three points per question (1 point for following directions); you are to work **individually** on this quiz; it is permissible to use your book and/or notes from the class. Show **all** work and any graphs/diagrams on **this** sheet. (use the back, if necessary; no additional pages, please)

1.) Find the area bounded by the two curves: $f(x) = x^2 - x - 5$ and $g(x) = x + 10$.

2.) Find the average value of the function $f(x) = x^2 - x + 1$ on $[0, 2]$.

3.) Integrate using substitution: $\int (2t^5 - 3)^2 t^4 dt$

MA 121 - 002

TEST #3 RESULTS

A's	<u>84</u> (44%)	}	<u>66.5%</u>
B's	<u>43</u> (22.5%)		
C's	<u>36</u> (18.8%)	}	<u>14.6%</u>
D's	<u>6</u> (3.1%)		
F's	<u>22</u> (11.5%)		

AVE: 82.435

121-001 & 121-002:

TUES

11/13 S.1

11/20 S.3
 S.6

11/27 S.7
 TEST 4 REV

12/4 6.1
 6.2

THURS

11/15 S.2
 S.3

Thanksgiving
Break

11/29 TEST #4

12/6 6.3:
 final exam
 review

12/10 12/18
 final exams