

1. demand funct: $p = -.01x^2 - .1x + 6$
market price: \$4/cartridge
determine the consumers' surplus.

$$CS = \int_0^{\bar{x}} D(x) dx - \bar{p}\bar{x}$$

$$D(x) = -.01x^2 - .1x + 6$$

$$\bar{p} = 4$$

$$4 = D(\bar{x}) = -.01\bar{x}^2 - .1\bar{x} + 6$$

Solve to get $\bar{x} = 10$ (or -20)

$$CS = \int_0^{10} (-.01x^2 - .1x + 6) dx - 4(10)$$

$$= 11.6 \quad (\text{in thousands})$$

$$= \$11,667$$

5. supply funct: $p = .01x^2 + .1x + 3$
market price: \$5/disc
determine the producer's surplus.

$$PS = \bar{p}\bar{x} - \int_0^{\bar{x}} S(x) dx$$

$$S(x) = .01x^2 + .1x + 3$$

$$\bar{p} = 5$$

$$5 = S(\bar{x}) = .01\bar{x}^2 + .1\bar{x} + 3$$

Solve to get $\bar{x} = 10$

$$PS = 5(10) - \int_0^{10} .01x^2 + .1x + 3 dx$$

$$= 11.6 \quad (\text{in thou})$$

$$= \$11,667$$

10. $T = 15$ yr franchise

$$R(t) = 400,000$$

$$r = 10\%/yr$$

find the Present value.

$$PV = \int_0^T R(t) e^{-rt} dt$$

$$= \int_0^{15} 400,000 e^{-.1t} dt$$

$$= -4,000,000 e^{-.1t} \Big|_0^{15}$$

$$= -4,000,000 (e^{-1.5} - 1)$$

$$= \$3,107,479.36$$

17. Present value of an annuity if
payments are monthly: \$1200
for 15 yrs & interest rate: 6%/yr

$$P = 1200 \quad T = 15$$

$$r = .06 \quad m = 12$$

$$PV = \frac{mP}{r} (1 - e^{-rT})$$

$$= \frac{12(1200)}{.06} (1 - e^{-.06(15)})$$

$$= 240,000 (1 - e^{-.9})$$

$$= \$142,423.28$$

24. Lorentz curve for income of

stockbrokers: $f(x) = \frac{11}{12}x^2 + \frac{1}{12}x$

high school teachers: $g(x) = \frac{5}{6}x^2 + \frac{1}{6}x$

- (a) compute the coef of inequality for each curve.

$$L = 2 \int_0^1 [x - f(x)] dx$$

stockbrokers: $L_s = 2 \int_0^1 (x - (\frac{11}{12}x^2 + \frac{1}{12}x)) dx = \frac{11}{6} \int_0^1 -x^2 + x dx = \frac{11}{6} (-\frac{1}{3}x^3 + \frac{1}{2}x^2) \Big|_0^1$

$$= \frac{11}{6} (-\frac{1}{3} + \frac{1}{2}) = \frac{11}{36}$$

teachers: $L_T = 2 \int_0^1 [x - (\frac{5}{6}x^2 + \frac{1}{6}x)] dx = \frac{5}{3} \int_0^1 -x^2 + x dx = \frac{5}{3} (-\frac{1}{3}x^3 + \frac{1}{2}x^2) \Big|_0^1$

$$= \frac{5}{3} (-\frac{1}{3} + \frac{1}{2}) = \frac{5}{18}$$

- (b) Which profession has a more equitable income distribution?

means: which L is closer to zero?

teachers b/c $\frac{5}{18} < \frac{11}{36}$