

Name: _____

11:00-11:55 (325)

3:30-4:20 (333)

Math211-2, Fall 2007

Quiz #8: 11-28-07

No Calculators.

1. (3 Points) Find the equilibrium quantity and price, the consumer surplus, and producer surplus for the supply and demand curves given by

$$D(q) = (q - 5)^2, \quad S(q) = q^2 + q + 3, \quad 0 \leq q \leq 5.$$

Section 6-1, problem # 15.

2. (2 Points) The supply and demand curves are shown below. Indicate the region whose area represents the consumer surplus, and the region which represents the producer surplus. Give your best estimate for the consumer and producer surplus.

Section 6-1, pbm # 17

3. (2 Points) Find the interest rate that must be paid by a bank so that an initial deposit doubles in 7 years, assuming that the interest is compounded continuously.

Use $FV = PV e^{rt}$ where $t = 7$.

Doubled money means $FV = 2PV$, so

$$2PV = PV e^{7r} \Rightarrow 2 = e^{7r} \quad (\text{divide by } PV)$$

$$\Rightarrow \ln 2 = 7r, \quad \boxed{r = \frac{1}{7} \ln 2}$$

4. (3 Points) When the usual breeding tanks are full, a fish farm uses a lake on its property to store excess breeding fish. If the farm puts fish into the lake at the rate of 1,000 fish per year and if the fish increase their population exponentially at the rate of 33%, find the fish population in the lake after 6 years. Assume that no fish dies or is removed.

Section 6-2, p. 11.

Use $FV = \int_0^6 1000 e^{r(6-t)} dt$ where $r = .33$.

$$FV = 1000 e^{6r} \int_0^6 e^{-rt} dt = 1000 e^{6r} \left. \frac{e^{-rt}}{-r} \right|_{t=0}^{t=6}$$

$$= 1000 e^{6r} \left(\frac{e^{-6r} - 1}{-r} \right)$$

$$= \boxed{1000 e^{6(.33)} \left(\frac{1 - e^{-6(.33)}}{.33} \right)}$$