Self Test
Electricity and Natural Monopoly

Click on True or False to test your knowledge of the chapter.

1. True False At a 7% growth rate, electricity consumption roughly doubles every decade.

2. True False Kilo, mega, giga, tera, and peta stand for a thousand, million, billion, trillion, and quadrillion, respectively.

3. True False If one kilowatt hour equals 3412 BTU or 860 kilocalorie, then 920 kilowatt hours equals 0.000293 BTU and 0.00116 kilocalories.

4. True False Net electricity consumption is the amount of energy delivered, gross electricity consumption is the amount of energy used to generate the electricity, and an electricity generators heat rate is the amount of energy needed to generate 1 kWh of electricity.

5. True False FSU is the most electricity intensive area of the world and Africa is the least electricity intensive.

6. True False Electricity growth is fastest in Africa.

7. True False Renewable energy resources produce the largest share of electricity worldwide.

8. True False If your cost curve is $TC = 100 + 500Q - Q^2$, then fixed cost, variable cost, average total cost, and marginal cost at output 10 are 100, 4900, 500, 480.

9. True False A daily load curve shows electricity consumption throughout the day.

10. True False Suppose a 100 megawatt gas turbine costs 600 per kilowatt hour of capacity, will last 20 years, runs only during peak demand (20% of the time), and has operating costs of 4 mills per kilowatt hour. Ignoring the time value of money, the average cost per kilowatt hour for this plant is 0.25.

11. True False If a monopoly faces a demand curve of $Q = 14 - 0.2P$, its marginal revenue curve is $Q = 14 - 0.4P$.

12. True False Suppose an electricity monopolist has a total cost $TC = 10 + 57Q - 2Q^2$ and faces demand of $Q = 14 - 0.2P$. Profit maximizing output would be $Q = 2.165$, $P = 59.165$ with monopoly profits of 4.083.

13. True False For the market in question 12, the socially optimal price = 5, quantity = 13 with profits = $348.

14. True False Social loss in the monopoly case compared to the competitive case is the monopoly profit of 4.08.

15. True False Economists argue that a decreasing cost industry is a natural monopoly which should be government owned or regulated.

16. True False Suppose the following Table contains sales, price, and operating costs (c_i = fuel and o_i = other operating costs.) for Power Packed Utility. The rate of return for Power Packed is 0.14 or 14%.

	p_i	q_i	c_i	o_i	RB
i=1	0.09	80000000	0.02	0.03	40,000,000
i=2	0.05	10000000	0.02	0.01	

17. True False It is easy to acquire all the information for the rate of return regulation formula $\Sigma_1^n p_i q_i$ = expenses + s(RB).

18. True False If the cost and shares of the various forms of financing for Generation Generating Company are in the following Table, the overall cost of capital for Generation is 10.4%.

	% of capitalization	capital cost (%)
Bonds	0.52	9
Pref. Stocks	0.10	8
Common Stocks	0.38	11

19. True False The rate of return on a long term corporate bond is approximately the annual coupon payment divided by the price.

20. True False If the market interest rate increases, a utilities bond price should increase.

21. True False If the interest rate is 0.10 and interest is compounded annually, then 100 today would be worth 110 in 10 years, while 100 in ten years would be worth 90.10 today.

22. True False If the interest rate is 10% and interest is compounded annually, the following annual stream of income beginning one year from now 20 30 40 is worth about 73.028 today.

23. True False If a stock's price is 20 and it pays dividends at the end of the next two years of 11, the cost of capital applied for this stock is -1.516 or -151.6%.

24. True False In the following Table are price indexes and the cost of a piece of equipment for three different years. After adjustment for inflation the equipment is cheapest in year 1998.

		Equipment
Year	Index	Cost

1998	98	450
1999	100	457
2000	103	458

25. True False If we allocate fixed cost to a market with elastic demand, the losses are higher than if we allocate them to a market with inelastic demand.

26. True False Suppose peak demand is $Q = 4 - 1/2P$ and off peak demand is $3 - 1/4P$. Capital costs are 5 per unit and operating costs are 1 per unit in both peak and off peak production. There is no peak shifting. The socially optimal peak price should be 5 and the off peak price should be 1.

27. True False The socially optimum price in a market with a natural monopoly is where marginal revenue equals marginal cost.

28. True False Suppose we have to allocate fixed charges across two customer classes, high (H) and low (L). Costs for each market separately are $Ch=100 + 2H$ and $Cl=50 + 3L$. Costs if we produce for both markets are $Cl\&h =120 + 2H + 3L$. These costs are subadditive.

29. True False Inverse demand curves in two markets are $Ph = 100 - 2H$ and $Pl = 50 -3L$ and joint costs are $Cl\&h =100 + 2H + 3L$. If we were producing L and H together, charging marginal cost in each market and fully distributing costs, it would be economically efficient to allocate all fixed costs to the high consumers.

30. True False Take the above market, where inverse demand curves in two markets are $Ph = 100 - 2H$ and $Pl = 50 -3L$, joint costs are $Cl\&h =100 + 2H + 3L$, and costs for each market separately are $Ch=100 + 2H$ and $Cl=50 + 3L$. If we charged marginal costs in both markets and allocated all fixed costs to H, then H would be subsidizing L.

31. True False A mill is 100,000 BTU's.

32. True False The cost function if we produce for two markets is $C_{l\&h}=100 + 2H + 4L$. The socially efficient prices to charge are $P_H = 2$ and $P_L= 4$.

33. True False Costs are subadditive if a firm has increasing returns to scale. $[\partial(C(Q)/Q)/\partial Q]<0$. (Contributed by Oksana Chernenko)

34. True False A price cap may provide more incentives for productivity gains and cost reduction than rate of return regulation. (Contributed by Ganna Bielenka)

35. True False Suppose peak demand is $Qpk = 8 - 0.5Ppk$, off-peak demand is $Qopk = 6 - 0.6Popk$, unit costs for capital are constant at 6 and operating cost peak and off-peak are a constant 1.

To maximize social welfare you should charge 7 in the peak market and 1 in the off-peak market as shown in the figure below.