

NOTE: To receive partial credit, on the problems where you used a calculator, show what you had it compute and the output it gave.

#1. (10 points) Use the following table to estimate $\int_2^{14} f(t)dt$.

t	2	5	8	11	14
$f(t)$	-1	-3	0	5	7

#2. (5 points) Compute

$$\int_{-1}^1 \frac{x^2 + 1}{x^2 - 4} dx$$

#3. (10 points) The marginal cost of drilling an oil well depends on the depth at which you are drilling; drilling becomes more expensive, per meter, as you dig deeper into the earth. The fixed costs are \$100,000, and if x is the depth in meters, the marginal costs are

$$C'(x) = 400 + 2x \text{ dollars/meter.}$$

Find the total cost of drilling a 600-meter well.

#4. (7 points) If t is measured in days since June 1, the inventory $I(t)$ for an item in a warehouse is given by

$$I(t) = 4000(.8)^t.$$

Find the average inventory in the warehouse during the 30 days after June 1.

#5. For a product, the demand curve is $p = 100e^{-0.008q}$ and the supply curve is $p = 4\sqrt{q} + 10$ for $0 \leq q \leq 500$, where q is the quantity and p is the price in dollars per unit. The equilibrium quantity is $q = 91.22$ and equilibrium price is $p = 48.20$.

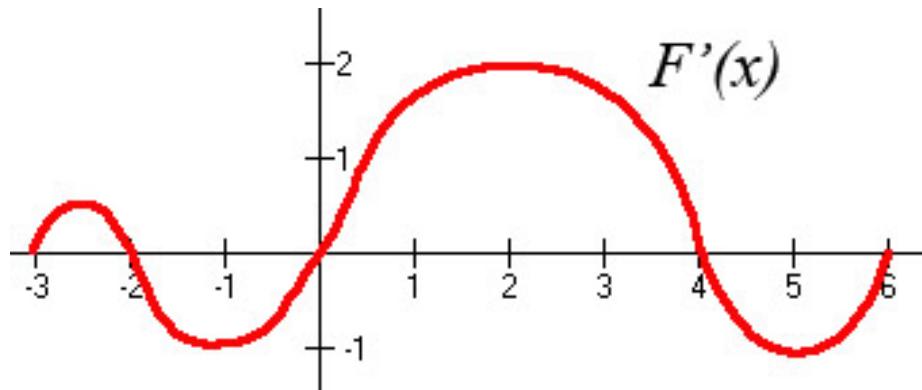
(i) (10 points) What is the consumer surplus?

(ii) (10 points) What is the total gain from trade?

#6. (8 points) Find the future value of an income stream of \$4000 per year over a 10-year period, assuming a 5% annual interest rate compounded continuously.

#7. (10 points) A company is expected to earn at a continuous rate given by $30000 \ln(t + 1)$ (where t is in years, $t = 0$ is right now) for the next 21 years. You can invest the earnings at a rate of 6%, compounded continuously. You have the chance to buy the rights to the earnings for \$700,000. Should you? Explain.

#8. (10 points) Given the following graph of the derivative of $F(x)$, i.e. it is the graph of $F'(x)$, determine whether each quantity is positive or negative.



- (i) $F(6) - F(0)$
- (ii) $F(6) - F(-3)$
- (iii) $F(0) - F(-3)$
- (iv) $F(4) - F(-2)$
- (v) $F(6) - F(4) + F(0) - F(-2)$

#9. (10 points) Explain in words what the following integral represents AND what the units of it are:

$$\int_{10}^{30} v(t)dt$$

where $v(t)$ is velocity in meters/second and t is time in seconds.

#10. (10 points) Given the following information

- $\int_0^4 f(t)dt = 4$
- $\int_7^9 f(t)dt = -2$
- $\int_0^9 f(t)dt = 8$

Find $\int_4^7 f(t)dt$