

1. For the following problems, no partial credit will be given.

- (a) Complete the statement (2 points)

$$\frac{d}{dx}(e^x) =$$

- (b) For a differentiable function $g(x)$, (2 points)

$$\frac{d}{dx}(e^{g(x)}) =$$

- (c) For any $b > 0$, (2 points)

$$\frac{d}{dx}(b^x) =$$

- (d) Suppose $y = f(x)$ satisfies the differential equation $y' = ky$, then

$y =$ _____ (2 points)

- (e) Suppose $y = Ce^{kx}$ for some constants C and k . Then y satisfies the

differential equation _____ (1 point)

- (f) For all values of x , $\ln e^x =$ _____ (1 point)

- (g) For which values of x is $e^{\ln x} = x$? (1 point)

- (h) Complete the statement (2 points)

$$\frac{d}{dx}(\log x) =$$

- (i) For a differentiable function $g(x)$, (2 points)

$$\frac{d}{dx}(\ln g(x)) =$$

- (j) The relative rate of change of $f(t)$ is given by _____ (2 points)

(k) Complete the following statements giving the properties of \ln .
For $x, y > 0$ and any real number b ,

i. $\ln(xy) =$ **(1 point)**

ii. $\ln(x^b) =$ **(1 point)**

iii. $\ln\left(\frac{x}{y}\right) =$ **(1 point)**

(l) If an initial amount of P dollars is deposited in an account where the interest is compounded continuously at an annual interest rate of r (expressed as a decimal), the amount in the account after t years is

$$A =$$

(2 points)

(m) If $x = f(p)$ is the demand equation relating the quantity x to the price p , the elasticity of demand is given by

$$E(p) =$$

(2 points)

(n) If $E(p) > 1$, then an increase in price results in a _____ **(1 point)**

in revenue, and the demand is said to be _____ **(1 point)**

(o) If $E(p) < 1$, then a decrease in price results in a _____ **(1 point)**

in revenue, and the demand is said to be _____ **(1 point)**

(p) The revenue function $R(p)$ is maximized when $E(p) =$ _____ **(2 points)**