

ECONOMICS 207  
FALL 2006  
PROBLEM SET 4

**Problem 1.** Solve the following equations for  $x$ .

a.  $\frac{12x-3}{4x-9} = \frac{9}{5}$

b.  $x^2 + 4x - 21 = 0$

c.  $600x^{-\frac{1}{3}} = 75$

d.  $x^{-\frac{1}{3}} = 75$

**Problem 2.** Solve the following systems of equations for  $K$  and  $L$  using the method of substitution.

a.

$$60K^{\frac{3}{4}}L^{-\frac{5}{8}} = 15$$

$$K^{-\frac{1}{4}}L^{\frac{3}{8}} = 1$$

b.

$$0.25K^{\frac{5}{6}}L^{-\frac{7}{9}} = 15$$

$$2K^{-\frac{1}{6}}L^{\frac{2}{9}} = 1$$

**Problem 3.** Solve the following systems of equation for  $x_1$ ,  $x_2$ , and  $x_3$  using the method of elimination.

$$2x_1 + 6x_2 + 3x_3 = -45$$

$$-9x_1 + 8x_2 - 8x_3 = 35$$

$$-5x_1 + 4x_2 + 3x_3 = -16$$

**Problem 4.** Find the derivatives of each of the following functions with respect to  $x$ .

a.  $f(x) = \frac{1}{b}x^b + ax - c$

b.  $f(x) = \frac{5 \ln(x)}{e^x}$

c.  $f(x) = e^{3(x^2+b)}$

d.  $f(x) = 2x \ln(x)$

e.  $f(x) = (ax^2e^x)^2$

f.  $f(x) = 4x^{-1} + z$

**Problem 5.** Find the derivatives of each of the following functions with respect to  $x$ .

a.  $f(x) = 5x^{\frac{1}{2}}z^{\frac{1}{3}} - 3x$

b.  $f(x) = \frac{3x^2+5x}{3x+5}$

c.  $f(x) = x^{-3} + 3x^2e^x$

d.  $f(x) = \frac{\ln(x)+zbx^2e^x}{(7x^2-7)^2}$

e.  $f(x) = (3x + 1)(5x - 4)$

f.  $f(x) = \frac{5x^2e^x}{8x^2+\ln(3x)}$

**Problem 6.** For each of the following, take the derivative with respect to  $x$ , set the derivative equal to zero and solve the resulting equation for  $x$ .

a.  $f(x) = 121x^{\frac{1}{11}} - x$

b.  $f(x) = 18x^{\frac{1}{3}} - 3x$

c.  $f(x) = 15x^{\frac{4}{5}} - 30x$

d.  $f(x) = 13x^{\frac{12}{13}} - 12x$