

The University of Calgary
Department of Mathematics and Statistics
MATH 249- 03
Quiz # 5R

Fall 2005

Name: _____ I.D.#: _____

1. Solve for x : $\log_5 x = \log_{25} (3x - 2)$. [3]
2. Find $f'(x)$ if $f(x) = x^{\cos x} + \ln \frac{1}{x}$ for $x > 0$. [4]
3. How much money do you have to invest to get \$10,000 in 5 years if the annual interest of 3% is compounded quarterly ? [3]

SOLUTION

FOR 1)

$$\log_5 x = \frac{\ln x}{\ln 5} = \frac{\ln(3x - 2)}{\ln 5^2} = \frac{\ln(3x - 2)}{2 \ln 5} \text{ for } x > 0$$

$$\text{so } 2 \ln x = \ln(3x - 2) \quad \ln x^2 = \ln(3x - 2)$$

$$\text{apply exp.f. } x^2 = 3x - 2 \quad x^2 - 3x + 2 = 0$$

$$(x - 1)(x - 2) = 0 \text{ for } x = 1 \text{ or } x = 2$$

FOR 2)

$$\text{express } x^{\cos x} = e^{\cos x \ln x}$$

$$f'(x) = (e^{\cos x \ln x})' - (\ln x)' = e^{\cos x \ln x} (\cos x \ln x)' - \frac{1}{x} =$$

$$= e^{\cos x \ln x} \left(-\sin x \cdot \ln x + \frac{\cos x}{x} \right) - \frac{1}{x}$$

FOR 3)

the correct formula is $A(t) = A_0 \left(1 + \frac{p}{100n} \right)^{nt}$ where $p = 3, n = 4, t = 5$ and $A = 10\,000$

$$\text{so } 10\,000 = A_0 \left(1 + \frac{3}{400} \right)^{20} = A_0 \left(\frac{403}{400} \right)^{20} \text{ thus } A_0 = 10\,000 \cdot \left(\frac{400}{403} \right)^{20} = \$ 8\,611.90$$