

Instructor Solution.

MATH110

Quiz9

Section009

Name:

~~It consists of 4 questions. Please show all your work to get full credit.~~

1 (2.5 pts) If $3^{t^2-4} = 27^t$, what is t ?

$$\text{(Sol)} \quad 3^{t^2-4} = 27^t \Rightarrow 3^{t^2-4} = (3^3)^t \Rightarrow 3^{t^2-4} = 3^{3t}$$

$$\Rightarrow t^2-4 = 3t \Rightarrow t^2-3t-4 = 0$$

$$(t-4)(t+1) = 0$$

$$t = -1, t = 4.$$

Ans: $t = -1$ or $t = 4$.

2 (2.5 pts) Solve $3^{x-x^2} = \frac{1}{9^x}$.

$$\text{Sol} \quad 3^{x-x^2} = \left(\frac{1}{9}\right)^x \Rightarrow 3^{x-x^2} = (3^{-2})^x$$

$$\Rightarrow 3^{x-x^2} = 3^{-2x} \Rightarrow x-x^2 = -2x$$

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$$\Rightarrow x^2-3x = 0 \Rightarrow x(x-3) = 0 \Rightarrow x = 0, x = 3$$

Ans: $x = 0$ or $x = 3$.

3 (2.5 pts) Simplify $A = \log_3 27 + \ln\left(\frac{1}{e^4}\right) - \log_5 1$.

Sol

$$A = \log_3(3^3) + \ln(e^{-4}) - \log_5 1$$

$$= 3 \cdot \log_3 3 + (-4) \ln e - \log_5 1$$

$$= 3 - 4 - 0 = -1.$$

4 (2.5 pts) Solve $12 - e^{0.4t} = 3$.

Sol

$$9 = e^{0.4t}$$

$$\ln 9 = \ln e^{0.4t} \Rightarrow \ln 9 = (0.4t) \cdot \ln e$$

$$\Rightarrow \ln 9 = (0.4)t \Rightarrow t = \frac{\ln 9}{0.4}$$