Classwork 12, MATH 1113 Harrison Chapman

Name: Key

8:00 or 9:30

1. Find the number, if possible.

a) $\log_4(1)$

0

b) $\log_5(5)$

1

c) $\log_4(0)$

DNE

d) $\log_5(5^7)$

7

e) $4^{\log_4(3)}$

3

f) $\log_4(1024)$

5

g) $\log_3(729)$

6

2. Solve for x. Give a symbolic answer (NOT a decimal).

a) $6^x = 968$

$x = \log_6(968)$

b) $e^{-x/7} = \dfrac{76}{101}$

$-x/7 = \ln\left(\frac{76}{101}\right)$

$\boxed{x = -7\ln\left(\frac{76}{101}\right)}$

c) $\log_7(4x+1) = 3$

$4x+1 = 7^3$

$4x = 7^3 - 1$

$\boxed{x = \dfrac{7^3-1}{4}}$

3. You invest \$6,350 at 8% per annum compounded continuously. Determine the exact time T (in years) for your investment to be worth \$10,050.

$$10050 = 6350e^{0.08t}$$

$$\frac{10050}{6350} = e^{0.08t}$$

$$\ln\left(\frac{10050}{6350}\right) = 0.08t$$

$$\boxed{\frac{\ln\left(\frac{10050}{6350}\right)}{0.08} = t}$$

4. Money is invested at interest rate r (a decimal), compounded continuously. Express the exact time required for the money to quadruple, as a function of r.

$$4P = Pe^{rt}$$

$$4 = e^{rt}$$

$$\ln(4) = rt$$

$$\boxed{\frac{\ln(4)}{r} = t}$$

Zeroes.

5. Determine the range and domain of the function $\ln(-x^2 + 8x - 15)$.

Domain $\ln(z)$: $(0, \infty)$ ie $z > 0$

Solve $-x^2 + 8x - 15 > 0$

$-x^2 + 8x - 15 = 0$, when

$$x = \frac{-8 \pm \sqrt{64 - 4(15)}}{-2} = \frac{-8 \pm 2}{-2}$$

$$= \frac{10}{2} \text{ and } \frac{6}{2} \quad \boxed{\text{Domain } \left(\frac{6}{2}, \frac{10}{2}\right)}$$

Range?

maximum of

$y = -x^2 + 8x - 15$ is at

$$x = \frac{-8}{-2} = 4$$

$$y = -16 + 32 - 15 = 1$$

$$\boxed{\text{Range}: (-\infty, \ln(1)) = (-\infty, 0)}$$