

$$\textcircled{1} \ln\left(\frac{2x(x-2)}{4}\right) = 1 \quad [x > 0, x > 2]$$

$$2x(x-2) = 4e$$

$$x_{1,2} = \frac{2 \pm \sqrt{4 + 4 \cdot 2e}}{2}$$

$$2x^2 - 4x - 4e = 0$$

$$x^2 - 2x - 2e = 0$$

$$\frac{2 \pm 2\sqrt{1+2e}}{2} = 1 \pm \sqrt{1+2e}$$

2

$$S = \{3.537\}$$

$$\text{not: } -1.537$$

$$\textcircled{2} 10164 = 10000 \cdot e^{kt}$$

$$k = \ln \frac{10164}{10000}$$

$$2 = 1 \cdot e^{kt}$$

$$t = \frac{1}{k} \ln 2$$

$$t = 42.61$$

$$k = 0.016267$$

Term Test B version 1

- (1) [5 points] Solve the following equation,

$$\ln 2x - \ln 4 + \ln(x-2) = 1$$

- (2) [5 points] How long will it take the world population to double at an exponential growth rate of 1.64% per year?

- (3) [5 points] Solve the following equation,

$$3^{x^2} = 175^{x-1}$$

- (4) [5 points] Suppose we are preparing a lovely *Canard à l'Orange* (roast duck with orange sauce). We first take our duck out of a 36°F refrigerator and place it in a 350°F oven to roast. After 10 minutes the internal temperature is 53°F. If we want to roast the duck until just under well-done (about 170°F internally), when will it be ready?

- (5) [5 points] Evaluate

$$\log_4(2 \cdot \sqrt{32}) + \log_{27} \sqrt{3}$$

- (6) [6 points] Solve the following three equations.

$$7^{x-5} = 2$$

$$\ln(5-2x) = -2$$

$$6 - 5e^x = -e^{2x}$$

$\textcircled{3}$

$$x^2 \ln 3 = (x-1)$$

$$\ln 175$$

$$x^2 \ln 3 -$$

$$x \ln 175 +$$

$$\ln 175 = 0$$

no way

6a.

$$(x-5) \ln 7 = \ln 2$$

$$x = \frac{\ln 2}{\ln 7} + 5$$

$$S = \{5.3563\}$$

6b.

$$5 - 2x = e^{-2}$$

$$x = \frac{e^{-2} - 5}{-2}$$

$$S = \{2.43233\}$$

6c.

$$e^{2x} - 5e^x + 6 = 0$$

$$e^x = 3 \text{ or } e^x = 2$$

$$S = \{\ln 2, \ln 3\}$$

$$53 = 350 + (36 - 350)e^{kt}$$

$$\frac{1}{10} \ln \frac{53 - 350}{36 - 350} = k = \frac{1}{10} \ln \frac{53 - 350}{36 - 350} = -0.00557$$

$$170 = 350 + (36 - 350)e^{kt}$$

$$\frac{1}{k} \ln \frac{170 - 350}{36 - 350} = t = 99.969$$