Hon Pre-Calc Test Chapter 3

Name

No Calculators!!! Leave Answers in Simplified Calculator Ready Form!!! Circle All Final Answers!!!

Short Answer

- 1. Given: $f(x) = -1 \log_2 (5 2x) 2$. Use interval notation to write:
 - a) Domain =
 - b) Range =
 - c) Write the equation(s) of any asymptotes

2. Find the exact rational value.

3. Solve for x:

$$\frac{5}{4 - 3e^{4x}} = 25$$

4. Find the exact value of the logarithmic expression:

a)
$$\log_2 \sqrt[4]{64}$$

b)
$$\log_3(-27)$$

5. Solve for x:

$$\ln\left(x^2 - 2\right) - \ln x = 1$$

6. Solve for x:

$$8e^{2x} - 2e^x - (15) = 0$$

7. Solve:
$$(\ln x)^5 = \ln(x^9)$$

8. Solve:
$$4(3^{k-1}) = 8(2^{2x-3})$$

9. Solve for
$$x$$
 in terms of a :

$$\log_b x = 3 - a + \log_b \left(\frac{a^4 b^a}{b^3} \right)$$

10. Solve for x:

$$2x\ln\left(\frac{1}{x}\right) - x = 0$$

11. A bacteria culture starts with 3000 bacteria. After 3 hours there are 48,000 bacteria present. How long (IN MINUTES) did it take to double?



7. Solve:
$$(\ln x)^5 = \ln(x^9)$$

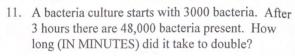
8. Solve:
$$4(3^{k-1}) = 8(2^{2x-3})$$

9. Solve for x in terms of a:

$$\log_b x = 3 - a + \log_b \left(\frac{a^4 b^a}{b^3} \right)$$

10. Solve for x:

$$2x \ln \left(\frac{1}{x}\right) - x = 0$$





- 12. A sample of a radioactive isotope decreases from 6 mg to 4 mg in 30 years. What is the half life period of the isotope? (Use natural logs to solve)
- 14. The population of Florida and Michigan are growing exponentially. If Florida currently has 22 million people and Michigan currently has 10 million people and if the populations of the two states increase annually by 2% and 4%, respectively, when will their populations be the same? (Use natural logs to solve)

- 13. Suppose the number of bugs in your house is growing exponentially. If there were 54 bugs after 3 weeks and 486 bugs after 5 weeks, how many bugs were there initially?
- 15. Solve for x:

$$\ln\sqrt{x+4} - \ln\sqrt{x-2} = \ln\sqrt{x+1}$$

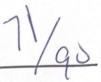
$$\ln \left[\frac{\sqrt[3]{x-1} (3x-2)^4}{(x+1) \sqrt{x-1}} \right]^2$$

17.
$$\frac{1}{2}\log_a(x+3) + \frac{1}{2}\log_{\mathbb{R}}(x-3) = \frac{2}{3}\log_a 125$$

18. Condense:
$$\ln(x^2 + 3x + 9) - \ln(x^3 - 27) + \ln(x - 3) + \ln(x - 2) - \ln(x^2 - 4)$$

Hon Pre-Calc Test Chapter 3





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Short Answer

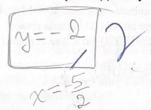
ort Answer
$$5-3\times 3 \qquad -2\times 4 \qquad$$

notation to write:

a) Domain =
$$\left(-\infty, \frac{5}{2}\right)$$

b) Range =
$$(-\infty, -2)$$

c) Write the equation(s) of any asymptotes



2. Find the exact rational value.

$$\log_{9}(7) + \log_{27}(81)$$
 $\log_{9}(9) + \log_{27}(81)$
 $\log_{9}(9) + \log_{27}(81)$
 $3 \times = 4$
 $3 - \frac{4}{3} = \frac{9}{3} = \frac{4}{3}$
 $3 \times = 4$

3. Solve for x:

$$\frac{5}{4-3e^{4x}} = 25$$

$$5 = 25(4-3e^{4x})$$

$$\frac{1}{5} = 4 - 3e^{4x}$$

$$-\frac{19}{5} = -3e^{4x}$$

$$\frac{19}{5} = e^{4x}$$

4. Find the exact value of the logarithmic expression:

a)
$$\log_2 \sqrt[4]{64}$$

 $\log_2 \sqrt[4]{4^3} = \log_2 (4)^{\frac{3}{4}} = \frac{3}{4} \log_2 4 = \frac{3}{4} (2) = \boxed{\frac{3}{2}}$

- b) $\log_3(-27)$ rundefines
- 5. Solve for x:

5. Solve for x:

$$\ln(x^{2}-2) - \ln x = 1$$

$$\ln(\frac{\chi^{2}-2}{\chi}) = 1$$

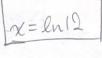
$$e = \frac{\chi^{2}-2}{\chi}$$

$$e = \chi^{2}-2$$

$$\chi^{2}-e \times -2 = 0$$

$$(\chi-2e)(\chi+e) = 0$$

6. Solve for x:





7. Solve: $(\ln x)^5 = \ln(x^9)$

lnx lnx lnx lnx lnx = 9 lox

(lnx)4=9

4/31 = 3 = 3 = 3 =

lnx = 497 = 432 = 13

 $\chi = e^{\sqrt{3}}$ $4 = 8(2') = 7(8) = 4 \times 2 = 2 = 2$

8. Solve: $4(3^{k-1}) = 8(2^{2x-3})$

 $\ln 3^{x-1} = \ln 2 + \ln 2$

 $(x+)\ln 3 = \ln 2 + (2x-3)\ln 2$

xln3-ln3=ln2+2xln2-3ln2

xln3-ln3=ln2+xln4-ln8

xb3-xln4=ln2+ln3-ln8

 $\chi(\ln(\frac{2}{4})) = \ln(\frac{6}{7}) = \ln(\frac{3}{4})$ 9. Solve for x in terms of a:

 $\log_b x = 3 - a + \log_b \left(\frac{a^4 b^a}{b^3} \right)$

log x - log (a46a) = 3-a

log (xb3) = log (xb3) = 3-a

 $b^{3-\alpha} = \frac{xb^3}{4b^{\alpha}}$

Ind= 7/15

10. Solve for x:

 $2x \ln \left(\frac{1}{x}\right) - x = 0$ x(2ln(=)-1)=0

In(\frac{1}{\times})=\frac{1}{2}

11. A bacteria culture starts with 3000 bacteria. After 3 hours there are 48,000 bacteria present. How long (IN MINUTES) did it take to double?

48000 = 3000(2)T

16=2+ 3

7=log_16= 4

7 = 4 hours × 60 = 240 minutes

48000 = 3000e36

16=e3b

ln 16=36

6= ln16

45 mins

6000 = 3000 e ((n 16))

7. Solve:
$$(\ln x)^5 = \ln(x^9)$$

$$\ln x = \sqrt[4]{9} = \sqrt{3^2} = \sqrt{3}$$

$$= \sqrt{3}$$

8. Solve:
$$4(3^{x-1}) = 8(2^{2x-3})$$

$$3^{x-1} = 2(2^{2x-3})$$

$$3^{*} = 1(2)$$
 $\ln 3^{*-1} = \ln 1 + \ln 2$

$$(x+)\ln 3 = \ln 2 + (2x-3)\ln 2$$

$$\frac{\chi \ln 3 - \ln 3 = \ln 2 + \chi \ln 4}{\chi \ln 3 - \chi \ln 4 = \ln 2 + \ln 3 - \ln 8}$$

$$\chi \left(\ln \left(\frac{2}{4}\right)\right) = \ln \left(\frac{6}{7}\right) = \ln \left(\frac{3}{4}\right)$$
9. Solve for x in terms of a:

$$\chi(ln(\frac{3}{4})) = ln(\frac{6}{7}) = ln(\frac{3}{4})$$

$$\log_b x = 3 - a + \log_b \left(\frac{a^4 b^a}{b^3} \right)$$

$$\log_b x - \log_b \left(\frac{a^4 b^4}{b^7}\right) = 3 - a$$

$$log_b\left(\frac{x}{a^4b^9}\right) = log_b\left(\frac{xb^3}{a^4b^9}\right) = 3-\alpha$$

$$b^{3-\alpha} = \frac{xb^3}{4b^{\alpha}}$$

$$ab = xb$$

$$\int x = ci^4$$

$$2x \ln\left(\frac{1}{x}\right) - x = 0$$

$$x \left(2 \ln\left(\frac{1}{x}\right) - 1\right) = 0$$

$$2 \ln\left(\frac{1}{x}\right) - 1 = 0$$

$$2 \ln\left(\frac{1}{x}\right) = 1$$

$$\ln\left(\frac{1}{x}\right) = \frac{1}{2}$$

$$e^{\frac{1}{2}} = \frac{1}{x}$$

$$\sqrt{e} = \frac{1}{x}$$

11. A bacteria culture starts with 3000 bacteria. After 3 hours there are 48,000 bacteria present. How long (IN MINUTES) did it take to double?

$$lnd = + (16)^{2}$$
 $lnd = + (16)^{2}$
 $lnd = + (16)^{2}$
 $lnd = + (16)^{2}$

of the isotope? (Use natural logs to solve)

$$4 = 6 \left(\frac{1}{2}\right)^{3/4}$$

$$4 = 6e^{\frac{1}{2}}$$

$$1 = 2 \ln(\frac{1}{2})$$

$$4 = 6e^{\frac{1}{2}}$$

$$4 = 9 \ln(\frac{1}{2})$$

$$4 = 9 \ln(\frac{1}{2})$$

$$4 = 6e^{\frac{1}{2}}$$

$$4 = 9 \ln(\frac{1}{2})$$

growing exponentially. If there were 54 bugs after 3 weeks and 486 bugs after 5 weeks, how many bugs were there initially?

bugs were there initially:
$$54 = P(R)$$

$$486 = P(R)^{5}$$

$$54 = \frac{486}{R^{3}}$$

$$54R^{5} = \frac{486}{R^{5}}$$

$$54R^{2} = \frac{1}{486}$$

$$R^{2} = \frac{1}{486}$$

14. The population of Florida and Michigan are growing exponentially. If Florida currently has 22 million people and Michigan currently has 10 million people and if the populations of the two states increase annually by 2% and 4%, respectively, when will their populations be the same? (Use natural logs to solve)

respectively, when will then popular same? (Use natural logs to solve)
$$A = 22(1.02)^{\frac{1}{2}} A = 12e^{1.02}$$

$$A = 10(1.04)^{\frac{1}{2}} A = 10e^{1.04}$$

$$21e^{1.02} = 10e^{1.04}$$

$$2.1e^{1.02} = 1.04$$

$$2.2 = 1.04$$

$$2.2 = 0.02$$

$$1.2 = 0.02$$

15. Solve for x:

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

$$\ln \left[\frac{\sqrt[3]{x-1} (3x-2)^4}{(x+1)\sqrt{x-1}} \right]^2$$

2 ln 3/x-1 + 2 ln (3x-2) - 2 ln (x+1) - 2 ln x+1

2ln (x-1) 1/3 + 2ln (3x-2) 1/4 - 2ln (x+1) - 2ln (x-1) 1/2

 $\frac{2}{3}$ ln(x-1)+ $\frac{1}{2}$ ln(3x-2)-2ln(x+1)-ln(x-1)

$$-\frac{1}{3}\ln(x-1) + \frac{1}{2}\ln(3x-2) - 2\ln(x+1)$$

17.
$$\frac{1}{2}\log_a(x+3) + \frac{1}{2}\log_{\mathbb{R}}(x-3) = \frac{2}{3}\log_a 125$$

$$\frac{1}{2}\log_{\mathbb{R}}(x+3) + \frac{1}{2}\log_{\mathbb{R}}(x-3) - \frac{12}{3}\log_{\mathbb{R}}(x+3) = 0$$

loge (2/125) = 0

9= \(\sqrt{\frac{1}{25}}\sqrt{\frac{1}{25}}\)

25= Nx+3 Nx-3

695=(x+3)(x-3)

625=x2-9x

x2-634=0

18. Condense:
$$\ln(x^2 + 3x + 9) - \ln(x^3 - 27) + \ln(x - 3) + \ln(x - 2) - \ln(x^2 - 4)$$

$$\ln(x^2 + 3x + 9) = \ln(x - 3) + \ln(x^2 + 3x + 9) + \ln(x - 3) + \ln(x - 2) - \ln(x - 2) - \ln(x + 2)$$

$$\ln \left(\frac{(x^2+3x+9)(x3)(x2)}{(x-3)(x^2+3x+9)(x2)(x+2)} \right) = \ln \left(\frac{1}{x+2} \right)$$

