

Precalc Review Ch. 11

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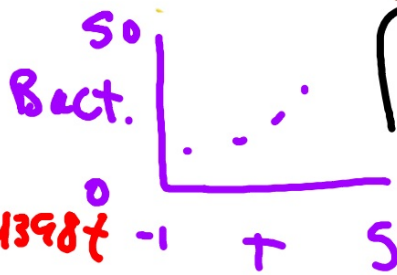
Test Mon. Ch. 11

4. **Biology** The data below give the number of bacteria found in a certain culture.

| Time (hours) | 0 | 1 | 2 | 3 | 4 |
|--------------|---|---|----|----|----|
| Bacteria | 6 | 7 | 12 | 20 | 32 |

- Find an exponential model for the data.
- Write the equation from part a in terms of base e .
- Use the model to estimate the doubling time for the culture.

b) $\text{bact.} = 5.24 e^{0.4398t}$



Extra Prac

$$y = 5.24 (1.5524)^x$$

$e^{0.4398x}$

* in terms of e

c) $10.48 = 5.24 e^{0.4398t}$
 $\ln 2 = e^{0.4398t}$

$$0.6931 = 0.4398t$$

$$1.576 = t$$

hrs.

$$\ln 1.5524 = \ln e^{0.4398t}$$

$$0.4398 = n$$

Lesson 11-7 (Pages 740–748)

Find the amount of time required for an amount to double at the given rate if the interest is compounded continuously.

1. 4.5%

2. 6%

3. 8.125%

$$A = Pe^{rt}$$

$$\frac{200}{100} = \frac{100}{100} e^{0.08125t}$$

$$\textcircled{2} = e^{0.08125t}$$

$$t = 8.53$$

Lesson 11-1 (Pages 695-703)

Evaluate each expression.

1. $(-12)^{-2}$

2. -12^{-2}

3. $(4 \cdot 6)^3$

5. $\frac{16}{16^{\frac{1}{2}}}$

6. $27^{\frac{1}{2}} \cdot 20^{\frac{1}{2}}$

7. $(\sqrt[4]{625})^2$

4. $\left(\frac{2}{3}\right)^4$

8. $\frac{1}{\sqrt{(15)^6}} = \frac{1}{15^2} = \frac{1}{225}$

Simplify each expression.

9. $(2a^4)^2$

10. $(x^4)^3 \cdot x^5$

11. $((3f)^{-2})^3$

12. $\left(\frac{c^{-3a}}{c^{4a}}\right)^2$

13. $(2n^{\frac{1}{3}} \cdot 3n^{\frac{1}{3}})^6$

14. $\left(\frac{h^6}{216h^{-3}}\right)^{-\frac{1}{3}}$

15. $\sqrt[3]{z^4(z^4)^{\frac{1}{2}}}$

16. $(4r^2t^5)(16r^4t^8)^{\frac{1}{4}}$

$\left(\frac{h^6 h^3}{216}\right)^{-\frac{1}{3}}$
GEMA
 $\left(\frac{h^9}{216}\right)^{-\frac{1}{3}} \left(\frac{216}{h^9}\right)^{\frac{1}{3}} = \frac{6}{h^3}$

$4r^2t^5 \cdot 2r^1t^2$
 $8r^3t^7$

Express using rational exponents.

17. $\sqrt{a^3b^5}$

18. $\sqrt[3]{64m^9n^6}$

19. $15\sqrt[3]{r^{12}t^2}$

20. $\sqrt[8]{256x^2y^{16}}$

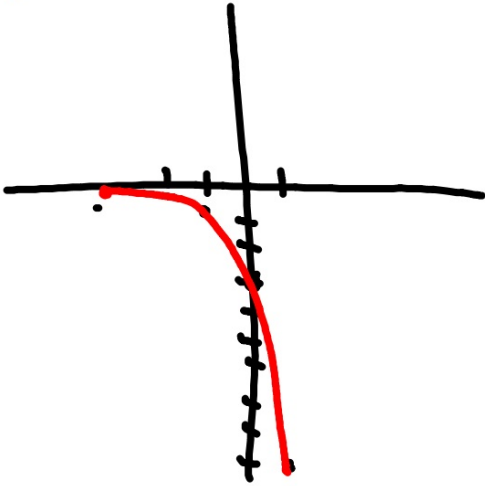
~~20. $\sqrt[8]{256x^2y^{16}}$~~

$$(256x^2y^{16})^{\frac{1}{8}}$$
$$2x^{\frac{2}{8}}y^{\frac{16}{8}} = 2x^{\frac{1}{4}}y^2$$

Lesson 11-2 (Pages 704-711)

Graph each exponential function.

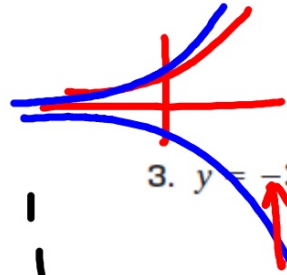
1. $y = 3^x$



2. $y = 3^{-x}$

| x | -3^{x+1} | |
|-----|------------|----|
| 0 | -3^1 | -3 |
| -1 | -3^2 | -9 |
| -1 | -3^0 | -1 |
| -2 | -3^1 | -3 |

3. $y = -3^{x+1}$



4. **Banking** Compare the balance after 20 years of a \$5000 investment earning 5.8% compounded continuously to the same investment compounded semiannually.

Contin

$$A = 5000e^{0.058 \cdot 20}$$
$$= 15949.66$$
$$+261.03$$

Semi ann

$$A = P \left(1 + \frac{r}{n}\right)^{nt}$$
$$= 5000 \left(1 + \frac{0.058}{2}\right)^{2 \cdot 20}$$
$$15688.63$$

Lesson 11-4 (Pages 718-725)

Write each equation in exponential form.

1. $\log_{16} 2 = \frac{1}{4}$

2. $\log_{\frac{1}{2}} 8 = -3$

3. $\log_4 \frac{1}{4} = -1$

Write each equation in logarithmic form.

4. $8^{-2} = x$

5. $x^5 = 32$

6. $\left(\frac{1}{4}\right)^{-2} = 16$

$\frac{1}{2}^{-3} = 8$

$\log_{\frac{1}{4}} 16 = -2$

Solve each equation.

10. $\log_3 y = 4$

13. $\log_4 \sqrt{4} = x$

11. $\log_5 r = \log_5 8$

14. $\log_4 (2x + 3) = \log_4 15$

12. $\log_5 35 - \log_5 \underline{d} = \log_5 5$
(d-2)

15. $4 \log_8 2 + \frac{1}{3} \log_8 27 = \log_8 \underline{a}$

$$\log_5 \frac{35}{d} = \log_5 5$$

$$\frac{35}{d} = \frac{5}{1}$$

$$5d = 35$$
$$d = 7$$

$$\log_8 2^4 + \log_8 27^{\frac{1}{3}} = \log_8 a$$

$$\cancel{\log_8} 16 \cdot 3 = \cancel{\log_8} a$$

$$48 = a$$

Find the value of each logarithm ~~using the change of base formula.~~

4. $\log_3 81$

5. $\log_6 12$

6. $\log_5 29 = x$

Solve each equation.

7. $3^x = 45$

8. $6^x = 2^{x-1}$

9. $5 \log y = \log 32$

$$\begin{aligned} \log 3^x &= \log 45 \\ x() &= () \\ x &= 3.4250 \end{aligned}$$

$$\begin{aligned} \log 5^x &= \log 29 \\ x() &= () \\ x &= 2.0922 \end{aligned}$$

Convert each logarithm to a natural logarithm and evaluate.

4. $\log_{15} 10$

5. $\log_3 14$

6. $\log_8 350 = x$

Use natural logarithms to solve each equation or inequality.

7. $5^x = 90$

8. $7^{x+2} = 5.25$

9. $4^x = 4\sqrt{3}$

10. $6e^x = 48$

11. $50.2 < e^{0.2x}$

12. $16 = 10(1 + e^x)$

$$\ln e^{0.2x} > \ln 50.2$$

$$0.2x(\ln e) > \ln 50.2$$

$$0.2x > 3.9160 \quad x > 19.58$$

$$\ln 8^x = \ln 350$$
$$x(\quad) = (\quad)$$
$$x = 2.8171$$

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PA-66