Pp. 407-408

Some answers are worked out on next 2 slides

14) 1.256

20) -0.61173

28) 1/8

36) 3

38) 11

48) 3

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20) $5^{x+2} = 4^{1-x}$

$(x+2)\log 5 = (1-x)\log 4$

$x\log 5 + 2\log 5 = \log 4 - x\log 4$

$x\log 5 + x\log 4 = \log 4 - 2\log 5$

$x(\log 5 + \log 4) = \log 4 - 2\log 5$

$\frac{x(\log 5 + \log 4)}{\log 5 + \log 4} = \frac{\log 4 - 2\log 5}{\log 5 + \log 4}$

$x = \frac{(\log 4 - 2\log 5)}{(\log 5 + \log 4)} = -.6173$

36) $\log_2(x+1) + \log_2(x-1) = 3$

$\log_2 x^2 - 1 = 3$

$2^3 = x^2 - 1$

$8 = x^2 - 1$

$x^2 - 1 - 8 = 0$

$x^2 - 9 = 0$

$x^2 = 9$

$x \neq \pm 3$

reject -3.

$x = 3$

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35) $\log(x+5) - \log(x-3) = \log 2$

$\log \frac{x+5}{x-3} = \log 2$

$\frac{x+5}{x-3} \times \frac{2}{1}$

$2x - 6 = x + 5$

$x = 11$

48) $\log_3 x + \log_3(x+1) = \log_3 2 + \log_3(x+3)$

$\log_3(x(x+1)) = \log_3(2(x+3))$

$x^2+x = 2x+6$

$-6 \quad -2x \quad -2x \quad -6$

$x^2 - x - 6 = 0$

$(x-3)(x+2) = 0$

$x = 3 \mid x = -2$ reject

argument > 0

$x = \{3\}$

Dec 1-4:55 PM

Review For Test: These formulas will be given to you.

Compounded Interest: $A = P\left(1 + \frac{r}{n}\right)^{nt}$

P = principal (amount invested)
A = Amount after t years
e = Euler's number

Compounded Continuously: $A = Pe^{rt}$

r = rate as a decimal
t = number of years
n = number of compounds per year

The mass of a radioactive element at time t is given by

$$A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$$

Where A_0 is the initial mass and h is the half-life of the element.

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Domain Restrictions

$\frac{1}{x}$ $x \neq 0$

$\sqrt{x}$ $x \geq 0$

$\frac{1}{\sqrt{x}}$ $x > 0$

Name Key - James
Date

PreCalc
Unit 4 Test Review

Find the inverse. State Domain & Range for f(x) and $f^{-1}(x)$

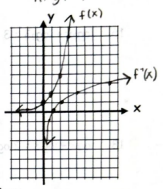
1. $f(x) = \sqrt{3x+2}$

① f(x) D: $[-2/3, \infty)$ R: $[0, \infty)$
② $y = \sqrt{3x+2}$
③ $x = \sqrt{3y+2}$
④ $x^2 = 3y+2$
$\frac{x^2-2}{3} = y$
⑤ $f^{-1}(x) = \frac{x^2-2}{3}$
⑥ $f^{-1}(x)$ D: $[0, \infty)$ R: $[-2/3, \infty)$

2. $f(x) = \frac{x-3}{2x+2}$

① f(x)
D: VA: $x \neq -1$
R: HA: $y \neq \frac{1}{2}$
② $y = \frac{x-3}{2x+2}$
③ $x = \frac{y-3}{2y+2}$
④ $2xy + 2x = y - 3$
$2xy - y = -2x - 3$
$y(2x-1) = -2x-3$
$y = \frac{-2x-3}{2x-1}$
⑤ $f^{-1}(x) = \frac{-2x-3}{2x-1}$ or $f^{-1}(x) = \frac{2x+3}{1-2x}$
⑥ $f^{-1}(x)$ D: $x \neq \frac{1}{2}$ R: $y \neq -1$

2. Graph $f(x) = 2^x$ and its inverse at the graph provided.



f(x): Domain $(-\infty, \infty)$ Range $(0, \infty)$
$f^{-1}(x) =$ $\log_a x$ Domain $(0, \infty)$ Range $(-\infty, \infty)$

3. If f(x) = log x, write the transformed function, g(x), with the given conditions

a. right 2, down 4
$g(x) = \log(x-2) - 4$

b. reflection x-axis, left 3, up 2
$g(x) = -\log(x+3) + 2$

Expand

4. $\ln\sqrt[3]{x^2y} = \frac{2}{3}\ln x + \frac{1}{3}\ln y$

5. $\log\frac{\sqrt[3]{xy^2}}{ab} = \frac{1}{3}\log x + 2\log y - \log a - \log b$

6. $\log\left(\frac{2x}{z^2}\right) = \log 2 + \log x - 2\log z$

7. $\ln\frac{x^4y^2}{\sqrt{z}} = 4\ln x + 2\ln y - \frac{1}{2}\log z$

Write as a single log. Simplify if possible.

8. $3\ln x - 4\ln y - \frac{1}{2}\ln z = \ln\frac{x^3}{y^4\sqrt{z}}$

9. $3\log x - 4\log y + \frac{1}{2}\log z = \log\frac{x^3\sqrt{z}}{y^4}$

10. $\log(x^2-9) - (\log(x+3) + \log(x-1))$
$\log\frac{(x-3)(x+3)}{(x+3)(x-1)} = \log\frac{x-3}{x-1}$

11. $2\ln x + 4\ln x = \ln x^2 x^4$
$= \ln x^6$

Solve for x. Where an exact answer is not possible, round to the nearest hundredth.

12. $25^{2x-1} = 125^{3x+4}$

$5^{2(2x-1)} = 5^{3(3x+4)}$

$4x-2 = 9x+12$

$-14 = 5x$

$\{-\frac{14}{5}\}$

13. $e^{4x} = 53$

$x = \frac{\ln 53}{4}$

$x = .99$

$\{.99\}$

14. $8^{x-3} = \left(\frac{1}{16}\right)^{1-x}$

$2^{3(x-3)} = 2^{-4(1-x)}$

$\therefore 3x-9 = -4+4x$

$-5 = x$

$\{-5\}$

15. $\ln(2x-3) = \ln 11$

$\therefore 2x-3 = 11$

$2x = 14$

$\{7\}$

16. $\log_2 x + \log_2 3 = 3$

$\log_2 3x = 3$

$3x = 8$

$x = \frac{8}{3}$

$\{\frac{8}{3}\}$

17. $2\log_3 x = 6$

$\log_3 x = 3$

$3^3 = x$

$\{27\}$

18. $\log x - \log 3 = 2\log 4$

$\log \frac{x}{3} = \log 16$

$\frac{x}{3} = 16$

$x = 48$

$\{48\}$

19. $4e^{x+1} = 16$

$e^{x+1} = 4$

$x+1 = \ln 4$

$x = \ln 4 - 1$

$x = .39$

$\{.39\}$

20. $\log_3 x + \log_3(x+8) = 2$

$\log_3 x(x+8) = 2$

$x^2+8x = 9$

$x^2+8x-9 = 0$

$(x+9)(x-1) = 0$

$x = -9$ $x = 1$

$\{1\}$

21. $\log(x^2+1) = 1$

$x^2+1 = 10$

$x^2 = 9$

$x = \pm 3$

$\{\pm 3\}$

22. Suppose that $10,000 is invested at an annual interest rate of 5.4% compounded quarterly. How much money will be in the account at the end of $6\frac{1}{2}$ years?

$A = 10000\left(1+\frac{.054}{4}\right)^{26}$

$A = \$14,171.56$

23. How old is a bone if it currently contains 20.45 grams of carbon-14 but was estimated to originally have 80 grams of carbon-14, whose half-life is 5730 years? ($A = A_0(\frac{1}{2})^{t/h}$) Round to the nearest hundred years.

$20.45 = 80(.5)^{t/5730}$

$\frac{409}{1600} = .5^{t/5730}$

$\log_{.5}\frac{409}{1600} = \frac{t}{5730}$

$t = 5730\log_{.5}\frac{409}{1600}$

$t = 11,300$ years

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