

More problems for section 5.3 of *Essentials of Precalculus with Calculus Previews* by Zill and Dewar, 6e.

1. Solve for  $x$ . (Hint:  $a^x$  is always positive.)

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|-----------------------------|------------------------------------|---------------------------------|
| a. $2^{1-3x} = \frac{1}{8}$ | b. $2^{1+x} = 4^{1-x}$             | c. $4 + 2^{2-x} = 0$            |
| d. $3^{2-x} = 1$            | e. $3^{2x-1} = 9$                  | f. $2^{3-x} = 16^{-x}$          |
| g. $3^{3x} = \frac{1}{3}$   | h. $3^{2x+4} = 27^{x-2}$           | i. $3^x \cdot 3^{2+x} = 9^{3x}$ |
| j. $10^{-3x} = 1,000,000$   | k. $10^{-2x+4} = \frac{1}{10,000}$ | l. $1 - 10^{4x+1} = 0$          |

2. Solve for  $x$ . No calculators. (Hint:  $a^{2x}$  is the same as  $(a^x)^2$ .)

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|--|--|--|
| a. $(3^x)^2 - 6 \cdot 3^x - 27 = 0$        | b. $2^{2x} - 12 \cdot 2^x + 32 = 0$        | c. $2^{2x} - 2 \cdot 2^x - 8 = 0$            |
| d. $2 \cdot 2^{2x} - 17 \cdot 2^x + 8 = 0$ | e. $3 \cdot 3^{2x} - 28 \cdot 3^x = -9$    | f. $25 \cdot 5^{2x} - 1 = 0$                 |
| g. $2^{2x} + 2^x - 6 = 0$                  | h. $4 \cdot 2^{2x} - 17 \cdot 2^x + 4 = 0$ | i. $9 \cdot 3^{2x} - 244 \cdot 3^x + 27 = 0$ |

3. Solve for  $x$ . No calculators.

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|----------------------------------|----------------------------------|-------------------------------------|
| a. $\ln(x-3) + \ln(x-4) = \ln 2$ | b. $\ln(x+1) + \ln(x-4) = \ln 6$ | c. $\log_6(x+1) + \log_6(x-4) = 1$  |
| d. $\ln(3x) - \ln(x+1) = \ln 2$  | e. $\ln(x+2) - \ln(x-1) = \ln 2$ | f. $\log_2(x-1) - \log_2(2x+1) = 3$ |
| g. $e^{x+2} = 1$                 | h. $e^{2x-1} = -3$               | i. $3^x = 4$                        |
| j. $2^x = 8^{x-1}$               | k. $9^x = 27^{2x+1}$             | l. $4^x = 3^{x+1}$                  |
| m. $10^{-x} = 7^{2x+1}$          | n. $3^{x+2} = 5^{x-1}$           | o. $8^{3x} = 6^{1-x}$               |
| p. $2^{x+1} = 3^{1-x}$           | q. $e^{2x+1} = 4$                | r. $e^{2-x} = 1$                    |
| s. $e^{4+x} = 2$                 | t. $2^{1-3x} = 5$                | u. $3^{2x} = 7$                     |
| v. $3^{1-x} = 12$                | w. $2^{x+4} = e^x$               | x. $5^{x-1} = e^{2x}$               |
| y. $5^x = -3^{2x}$               | z. $e^{2x} - 9e^x + 20 = 0$      | 27. $3^{2x} + 3^x - 6 = 0$          |

#### Answers

- 1a.  $x = 4/3$  1b.  $x = 1/3$  1c. no solution 1d.  $x = 2$  1e.  $x = 3/2$  1f.  $x = -1$  1g.  $x = -1/3$  1h.  $x = 10$  1i.  $x = 1/2$   
1j.  $x = -2$  1k.  $x = 4$  1l.  $x = -1/4$  2a.  $x = 2$  ( $3^x = -3$  has no solutions.) 2b.  $x = 2$  or  $x = 3$  2c.  $x = 2$  2d.  $x = -1$  or  
 $x = 3$  2e.  $x = -1$  or  $x = 2$  2f.  $x = -1$  2g.  $x = 1$  2h.  $x = \pm 2$  2i.  $x = -2$  or  $x = 3$  3a.  $x = 5$  3b.  $x = 5$  3c. same as  
part b. 3d.  $x = 2$  3e.  $x = 4$  3f. No solutions. 3g.  $x = -2$  3h. no solutions 3i.  $x = \ln 4 / \ln 3$  3j.  $x = 3/2$  3k.  $x = -3/4$   
3l.  $x = \ln 3 / (\ln 4 - \ln 3)$   
3m.  $x = (-\ln 7) / (2 \ln 7 + \ln 10)$  3n.  $x = (2 \ln 3 + \ln 5) / (\ln 5 - \ln 3)$  3o.  $x = (\ln 6) / (3 \ln 8 + \ln 6)$  3p.  $x = (\ln 3 - \ln 2) / (\ln 3 + \ln 2)$   
3q.  $x = \frac{1}{2}(-1 + \ln 4)$  3r.  $x = 2$  3s.  $x = -4 + \ln 2$  3t.  $x = \frac{1}{3}(1 - (\ln 5) / (\ln 2))$  3u.  $x = \frac{1}{2}(\ln 7) / (\ln 3)$  3v.  $x = -(\ln 4) / (\ln 3)$   
3w.  $x = (4 \ln 2) / (1 - \ln 2)$  3x.  $x = (-\ln 5) / (2 - \ln 5)$  3y. no solutions 3z.  $x = \ln 4$  or  $x = \ln 5$  327.  $x = \log_3 2$