1. Solve each equation.

[4] (a) $16^{-x+1} = 8^x$

Solution:		
$2^{4(-x+1)} = 2^{3x}$	[1]	
-4x + 4 = 3x	[1]	
-7x = -4	[1]	
$x = \frac{4}{7}$	[1]	

[4] (b) $16^{x+2} = 64^{2x-1}$

Solution:		
$2^{4(x+2)} = 2^{6(2x-1)}$	[1]	
4x + 8 = 12x - 6	[1]	
-8x = -14	[1]	
$x = \frac{7}{4}$	[1]	

[3]

(c) $4^x = 8^{x+1}$

Solution:		
$2^{2(x)} = 2^{3(x+1)}$	[1]	
2x = 3x + 3	[1]	
-x = 3		
x = -3	[1]	

[3] (d) $25^x = 125^{x-2}$

Solution:

$$5^{2(x)} = 5^{3(x-2)}$$
[1]

$$2x = 3x - 6$$
[1]

$$-x = -6$$

$$x = 6$$
[1]

[3] (e) $(e^4)^{-2x} = e^{-x+1}$

Solution:

-8x = -x + 1	[1]
-7x = 1	[1]
$x = -\frac{1}{7}$	[1]

[2] 2. Solve for y in the exponential equation $2^y = e^x$.

Solution:	
$e^{y\ln 2} = e^x$	[1]
$y\ln 2 = x$	
$y = \frac{x}{\ln 2}$	[1]

[2] 3. Solve for y in the exponential equation $2^y = 3^x$.

Solution:	
$e^{y\ln 2} = e^{x\ln 3}$	[1]
$y\ln 2 = x\ln 3$	
$y = \frac{x \ln 3}{\ln 2}$	[1]

[2] 4. Find the domain and range of the function $f(x) = (x - 2)^2$.

Solution:		
domain:	$\mathbb{R}=(-\infty,\infty)$	[1]
range:	$[0,\infty)$	[1]

[2] 5. Find the domain and range of the function $f(x) = \sqrt{3x+5}$.

Solution: domain: $\left[-\frac{5}{3},\infty\right)$ [1] range: $[0,\infty)$ [1]

[3] 6. Find the domain and range of the function $f(x) = (3x+5)^{1/2}$.

Solution:		
domain:	$\left[-\frac{5}{3},\infty ight)$	[2]
range:	$[0,\infty)$	[1]

[3] 7. Find the domain and range of the function $f(x) = \frac{2}{x-1}$.

Solution:			
	domain:	$(-\infty, 1) \cup (1, \infty)$ $(-\infty, 0) \sqcup (0, \infty)$	[2] [1]
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8. (Supply and Demand) Suppose the demand and price of a certain product are related by

$$p = D(q) = 16 - \frac{5}{4}q$$

and suppose the supply and price are related by

$$p = S(q) = \frac{3}{4}q$$

[1] (a) What price should be set if the demand is 4 units?

Solution:

$$p = D(4) = 16 - \frac{5}{4}(4) = 16 - 5 = 11.$$
 [1]

[3] (b) Find the equilibrium quantity for product.

Solution:		
S(q) = D(q)	[1]	
$\frac{3}{4}q = 16 - \frac{5}{4}q$		
$\frac{3+5}{4}q = 16$	[1]	
$\frac{2}{a} = 16$		
q = 8	[1]	

9. (Cost Analysis) Suppose a certain product has the cost function

$$C(x) = 5x + 25,$$

and each unit of this product is sold for \$10.

[1] (a) Write the revenue function, R(x), for this product.

Solution:

$$R(x) = px = 10x.$$
 [1]

[3] (b) Find the break-even quantity for this product.

Solution:	
R(x) = C(x)	[1]
10x = 5x + 25	
5x = 25	[1]
x = 5	[1]
x = 5	[1]