

Name: _____

Show work needed to justify your answer.

Date: _____

HW: # 8b: Math IBSL - Standard 8 - Linear Functions

5 points

1. Find $f^{-1}(x)$ for each of the following linear functions. Give your answers in the form $f^{-1}(x) = mx + c$.

a $f(x) = \frac{1}{2}x + 4$ b $f(x) = -3x + 9$

a) $x = \frac{1}{2}y + 4$

$x - 4 = \frac{1}{2}y$

$2(x - 4) = y$

$f^{-1}(x) = 2x - 8$

b) $x = -3y + 9$

$x - 9 = -3y$

$-\frac{1}{3}x + 3 = y$

$f^{-1}(x) = -\frac{1}{3}x + 3$

2. A t-shirt company imprints logos on t-shirts. The company charges a one-time set-up fee of \$65 and \$10 per shirt. The total cost of x shirts, in CAD, is given by $f(x) = 10x + 65$.

- a Find the total cost for 55 t-shirts.
 b Find $f^{-1}(x)$ and tell what x and $f^{-1}(x)$ represent in this function.
 c Find the number of t-shirts in an order with a total cost of \$5065.

a) $f(55) = 10(55) + 65$

$f(55) = 615$

b) $x = 10y + 65$

$x - 65 = 10y$

$f^{-1}(x) = \frac{1}{10}x - 6.5$

x is Total Cost
 $f^{-1}(x)$ is # shirts

c) $f^{-1}(5065) = \frac{1}{10}(5065) - 6.5$
 $= 500$

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- 3 A new fitness gym is offering two membership plans.

Plan A: A one-off enrollment fee of \$79.99, and a further monthly fee of \$9.99 per month

Plan B: no enrollment fee, and monthly fees of \$20.00 per month

- a Find a linear model for each plan, where total cost is a function of number of months. Identify the variables you use.

After a certain number of months, Plan A becomes more cost-effective than Plan B.

- b Use the models from part a to determine how many months a person needs to be a member before Plan A becomes more cost-effective than Plan B.

a)

$$A: y = 9.99x + 79.99$$
$$B: y = 20x$$

b)

$$9.99x + 79.99 = 20x$$
$$79.99 = 10.01x$$

$$x = 7.99$$

At 8 months

