# Handout 13: 2.13 Inverses

1. $C(m)$ represents the cost of a taxi ride as a function of miles traveled, $m \geq 0$. The table below shows $C(m)$for six values of $m$. Note: Not all values of $C(m)$ are shown.

| $m$ | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| $C(m)$ | 0 | 2.50 | 4.00 | 5.50 | 7.00 | 8.50 |

a) What does $C(3.5)$ mean in practical terms? (*Use words and units*)
b) Find $C(3.5)$.
c) What does $C^{-1}(3.5)$ mean in practical terms? (*Use words and units*)
d) Find $C^{-1}(3.5)$.

2. The function $y = 0.03x^2 + 254.50$ approximates the exhaust temperature $y$ of a diesel engine in degrees Fahrenheit, where $x$ is the percent load on the engine.
a. What would be an appropriate domain for this function?
b. Determine the inverse function.
c. What does each variable in the inverse function represent?
d. Determine the percent load interval if the exhaust temperature of the engine must not exceed 500°F.

3. Let $h(x) = 2(x-1)^3 + 5$ .
a. State the domain and range of $h(x)$.
b. Find $h^{-1}(x)$.
c. State the domain and range of $h^{-1}(x)$.
d. Sketch the graph of $h(x)$, $h^{-1}(x)$ and $h\left(h^{-1}(x)\right)$ on the same axis.
e. Evaluate: i. $h\left(h^{-1}(0)\right)$ ii. $h^{-1}\left(h(-2)\right)$ iii. $h^{-1}\left(h(a)\right)$, where '$a$' is any real number.

4. Let $g(x) = -\sqrt{3-2x} - 7$
a. State the domain and range of $g(x)$.
b. Find $g^{-1}(x)$.
c. State the domain and range of $g^{-1}(x)$..
d. Sketch the graph of $g(x)$, $g^{-1}(x)$ and $g\left(g^{-1}(x)\right)$ on the same axis.
e. Evaluate: i. $g\left(g^{-1}(0)\right)$ ii. $g^{-1}\left(g(-9)\right)$ iii. $g^{-1}\left(g(2)\right)$

5. Let $c(x) = \frac{4}{x+2} - 2$
a. State the domain and range of $c(x)$.
b. Find $c^{-1}(x)$.
c. State the domain and range of $c^{-1}(x)$.
d. Sketch the graph of$c(x)$, $c^{-1}(x)$. and $c\left(c^{-1}(x)\right)$ on the same axis.
e. Evaluate: i. $c\left(c^{-1}(0)\right)$ ii. $c^{-1}\left(c(-2)\right)$ iii. $c^{-1}\left(c(3)\right)$

6. Given $g(x) = k \cdot (x^3 + x - 4)$ and $g^{-1}(36) = 2$ , find $k$.

7. Given the graph of $B(t)$,

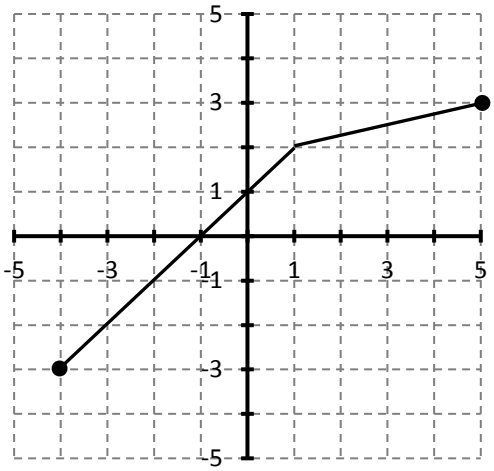
a. graph $y = B(-t)$.

b. graph $y = -B(t)$.

c. graph $y = B^{-1}(t)$.

d. graph $y = \big(B(t)\big)^{-1}$.

e. State the domain and range for a – d.




8. Fill in the table below.

| $x$ | $f(x)$ | $\big(f(x)\big)^{-1}$ | $f(-x)$ | $f^{-1}(x)$ |
|---|---|---|---|---|
| –3 | | –0.5 | | |
| –2 | | | | |
| –1 | | | –3 | |
| 0 | | | 1 | –2 |
| 1 | | | | |
| 2 | | | | –1 |
| 3 | –1 | | | 2 |