

Supplementary Homework on Linear Functions

Mathematics 140—Applied Calculus

Dr. Peratt

Directions: Neatly and completely answer the following questions. Where relevant, round your final answers to three decimal places.

1. Find formulas for the following linear functions, $s(t)$:

- (a) Points $(t, s) = (-1, 5)$ and $(2, -1)$ are on the line.
- (b) The line has slope 0.67 and passes through $(3, 7)$.
- (c) Has an initial value of -3.2 and each unit increase in t results in an increase of 5.2 in s .
- (d) $s(0.3) = 0.8$ and $s(0.8) = -0.4$.
- (e) The line is perpendicular to $s = -\frac{2}{3}t - 7$ and has vertical intercept 19.
- (f) The line is parallel to $s = 32.14t - 17.35$ and passes through $(t, s) = (-3.4, 5.8)$.
- (g) The line fits the following data:

t	0.50	0.75	1.00
s	1500	1000	500

2.

Without a calculator, match the equations (a)–(g) to the graphs (I)–(VII).

(a) $y = x - 5$

(b) $-3x + 4 = y$

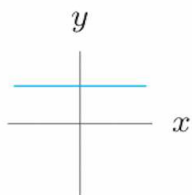
(c) $5 = y$

(d) $y = -4x - 5$

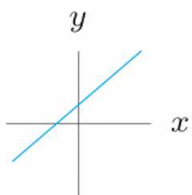
(e) $y = x + 6$

(f) $y = x/2$

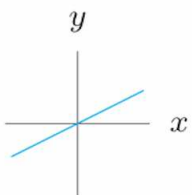
(g) $5 = x$



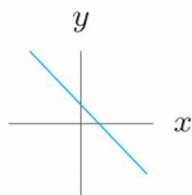
(I)



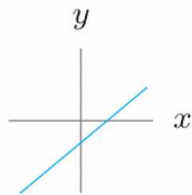
(II)



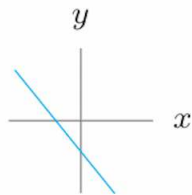
(III)



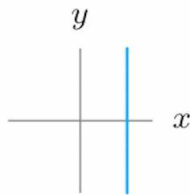
(IV)



(V)



(VI)



(VII)

3.

Without using a calculator, match the equations (a) – (f) to the graphs (I) – (VI).

(a) $y = -2.72x$

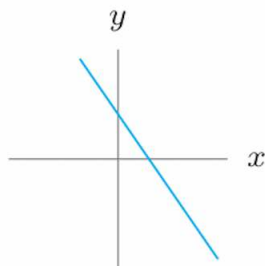
(b) $y = 0.01 + 0.001x$

(c) $y = 27.9 - 0.1x$

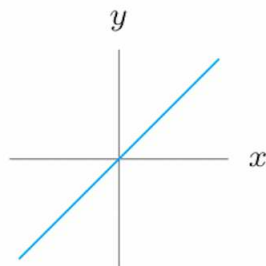
(d) $y = 0.1x - 27.9$

(e) $y = -5.7 - 200x$

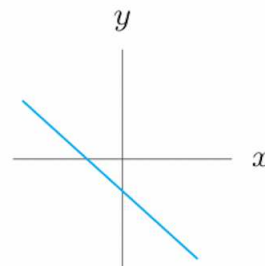
(f) $y = x/3.14$



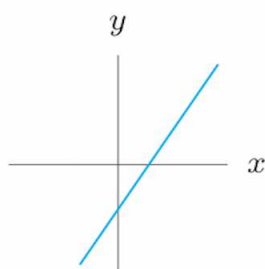
(I)



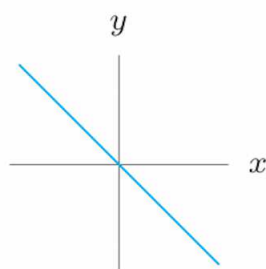
(II)



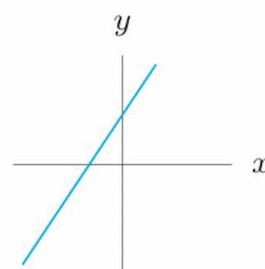
(III)



(IV)



(V)



(VI)

4.

Figure 1.45 gives lines, A, B, C, D, and E. Without a calculator, match each line to f, g, h, u or v :

$f(x) = 20 + 2x$

$g(x) = 20 + 4x$

$h(x) = 2x - 30$

$u(x) = 60 - x$

$v(x) = 60 - 2x$

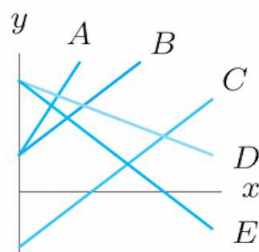


Figure 1.45

5.

Without a calculator, match the following functions to the lines in Figure 1.46:

$$f(x) = 5 + 2x$$

$$g(x) = -5 + 2x$$

$$h(x) = 5 + 3x$$

$$j(x) = 5 - 2x$$

$$k(x) = 5 - 3x$$

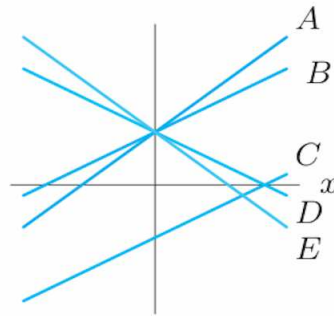


Figure 1.46

Supplementary Homework on Linear Functions—Solutions
Mathematics 140—Applied Calculus
Dr. Peratt

Directions: Neatly and completely answer the following questions. Where relevant, round your final answers to three decimal places.

1. Find formulas for the following linear functions, $s(t)$:

(a) Points $(t, s) = (-1, 5)$ and $(2, -1)$ are on the line.

Answer: $\frac{\Delta s}{\Delta t} = \frac{-1-5}{2-(-1)} = \frac{-6}{3} = -2$. So, $s = -2t + b$. Substituting $t = 2$ and $s = -1$, we obtain $-1 = -2 \cdot 2 + b \rightarrow b = 3$. So, $s = -2t + 3$.

(b) The line has slope 0.67 and passes through $(3, 7)$.

Answer: $s = 0.67t + b$, and so $7 = 0.67 \cdot 3 + b \rightarrow b = 4.99$, so $s = 0.67t + 4.99$.

(c) Has an initial value of -3.2 and each unit increase in t results in an increase of 5.2 in s .

Answer: $b = -3.2$ and $m = 5.2$, so $s = 5.2t - 3.2$.

(d) $s(0.3) = 0.8$ and $s(0.8) = -0.4$.

Answer: The points $(t, s) = (0.3, 0.8)$ and $(0.8, -0.4)$ are on the line, so the slope is $\frac{\Delta s}{\Delta t} = \frac{-0.4-0.8}{0.8-0.3} = -2.4$. So, $s = -2.4t + b$. Substituting in $t = 0.3$ and $s = 0.8$ gives $b = 1.52$. Therefore, $s = -2.4t + 1.52$.

(e) The line is perpendicular to $s = -\frac{2}{3}t - 7$ and has vertical intercept 19.

Answer: The slope is $m = \frac{3}{2} = 1.5$, and $b = 19$, so $s = 1.5t + 19$.

(f) The line is parallel to $s = 32.14t - 17.35$ and passes through $(t, s) = (-3.4, 5.8)$.

Answer: The slope is $m = 32.14$ and so $s = 32.14t + b$. Substituting in $t = -3.4$ and $s = 5.8$ gives $5.8 = 32.14 \cdot -3.4 + b \rightarrow b = 115.076$. So, $s = 32.14t + 115.076$.

(g) The line fits the following data:

t	0.50	0.75	1.00
s	1500	1000	500

Answer: We can use any two data pairs on the chart. I chose $(t, s) = (0.50, 1500)$ and $(1.00, 500)$. This gives a slope of $m = -2000$. So, $s = -2000t + b$. Substituting in $t = 1$ and $s = 500$ gives $b = 2500$. So, $s = -2000t + 2500$.

2.

Answer: (a)=V, (b)=IV, (c)=I, (d)=VI, (e)=II, (f)=III, (g)=VII.

Without a calculator, match the equations (a)–(g) to the graphs (I)–(VII).

(a) $y = x - 5$

(b) $-3x + 4 = y$

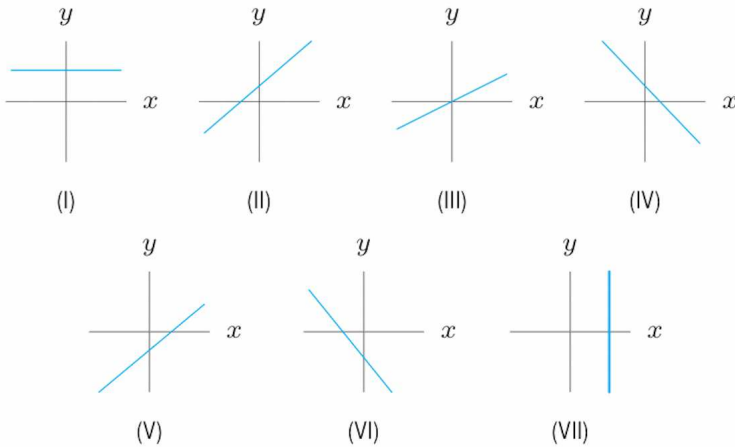
(c) $5 = y$

(d) $y = -4x - 5$

(e) $y = x + 6$

(f) $y = x/2$

(g) $5 = x$



3.

Answer: (a)=V, (b)=VI, (c)=I, (d)=IV, (e)=III, (f)=II.

Without using a calculator, match the equations (a) – (f) to the graphs (I) – (VI).

(a) $y = -2.72x$

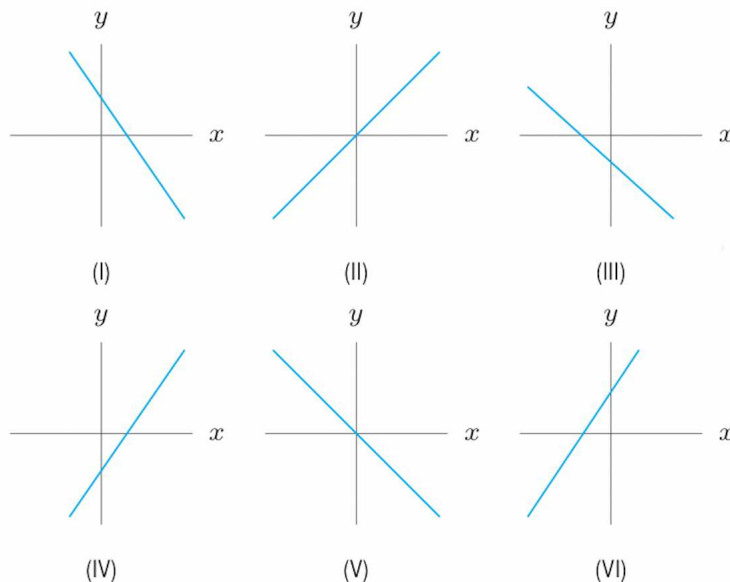
(b) $y = 0.01 + 0.001x$

(c) $y = 27.9 - 0.1x$

(d) $y = 0.1x - 27.9$

(e) $y = -5.7 - 200x$

(f) $y = x/3.14$



4.

Answer: $f(x) = B$, $g(x) = A$, $h(x) = C$, $u(x) = D$, $v(x) = E$.

Figure 1.45 gives lines, A , B , C , D , and E . Without a calculator, match each line to f , g , h , u or v :

$$f(x) = 20 + 2x$$

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$$h(x) = 2x - 30$$

$$u(x) = 60 - x$$

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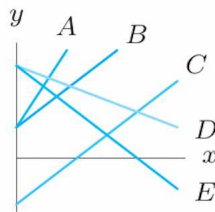


Figure 1.45

5.

Answer: $f(x) = B$, $g(x) = C$, $h(x) = A$, $j(x) = D$, $k(x) = E$.

Without a calculator, match the following functions to the lines in Figure 1.46:

$$f(x) = 5 + 2x$$

$$g(x) = -5 + 2x$$

$$h(x) = 5 + 3x$$

$$j(x) = 5 - 2x$$

$$k(x) = 5 - 3x$$

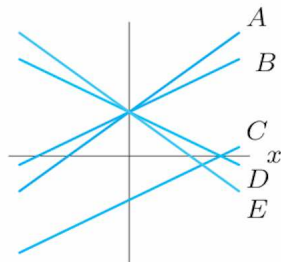


Figure 1.46