Note: Certain questions have been more challenging for students. Questions marked **(***)** are similar to those challenging questions.

Questions 1 and 2 refer to the following situation: The braking distance, $d(v)$, in feet, of a car traveling at v miles per hour is given by $d(v) = 2.2v + 0.05v^2$.

1. Evaluate $d(30)$ and give a practical interpretation.

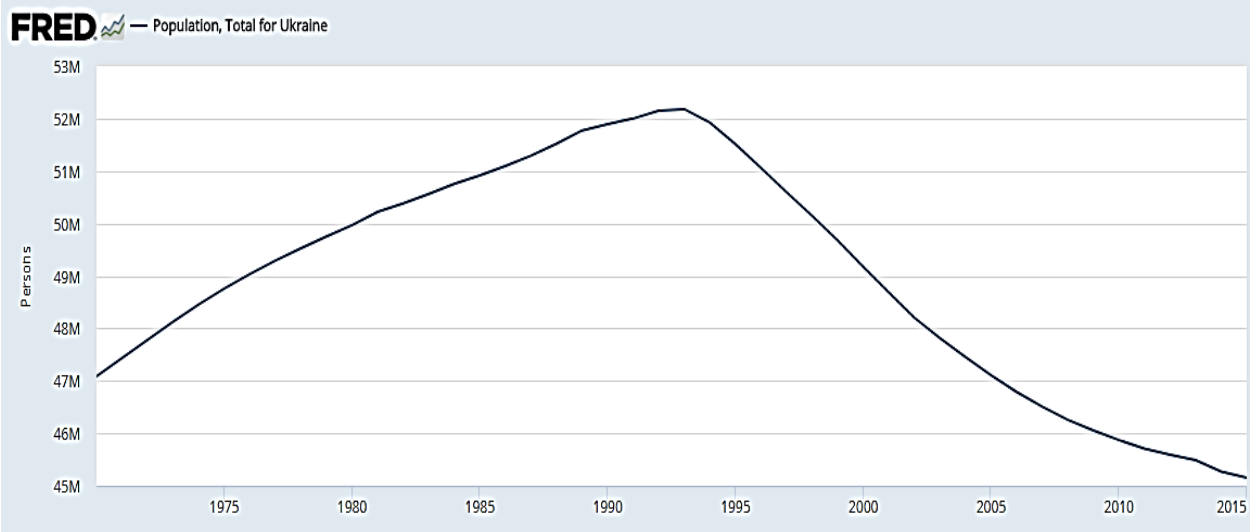
   (A) $d(30) = 111$. A car traveling 30 miles per hour will require a braking distance of 111 feet.
   (B) $d(30) = 111$. A car traveling 111 miles per hour will require a braking distance of 30 feet.
   (C) $d(30) = 111$. A car traveling 30 feet will require a braking distance of 111 feet.
   (D) $d(30) = 111$. A car traveling 111 feet will require a braking distance of 30 feet.

2. Suppose that the car took 500 feet to brake. Using the graph of $d(v)$, approximately how fast was the car traveling?

   The speed that the car was traveling was:

   (A) Less than 75 miles per hour
   (B) Between 75 and 77 miles per hour
   (C) Between 77 and 79 miles per hour
   (D) Between 79 and 81 miles per hour
   (E) More than 81 miles per hour

The following graph depicts the population of Ukraine, in millions, as a function of the year, over a several year period. Use this graph to answer questions 3 and 4.



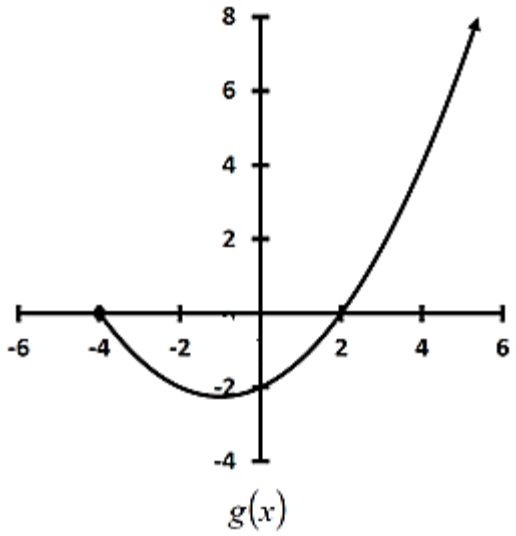
3. Identify the domain and range of this function.

(A) Domain: [1970, 2015] Range: [45, 52.2]
(B) Domain: [1970, 2015] Range: [45, 53]
(C) Domain: [47, 52.2] Range: [1970, 2015]
(D) Domain: [45, 53] Range: [1970, 2015]
(E) Domain: [1970, 2015] Range: [47, 52.2]

4. Identify the interval(s) over which the population of Ukraine was decreasing during this period.

(A) (45, 52.2)
(B) (47, 52.2)
(C) (1970, 1993)
(D) (1993, 2015)
(E) (52, 2015)

The graph of the function $y = g(x)$ is shown below. Use the graph to answer questions 5 and 6.



$g(x)$

5. Find the domain and range of g.

(A) Domain: $(-\infty, \infty)$ Range: $[-4, \infty)$
(B) Domain: $[-2.2, \infty)$ Range: $[-4, \infty)$
(C) Domain: $[-4, \infty)$ Range: $[-2.2, \infty)$
(D) Domain: $[-2.2, \infty)$ Range: $[-2.2, \infty)$
(E) Domain: $[-4, \infty)$ Range: $(-\infty, \infty)$

6. Determine the intercepts of g.

(A) $(2, 0)$ and $(0, -2)$ only
(B) $(-4, 0)$ and $(2, 0)$ only
(C) $(-4, 0)$, $(2, 0)$, and $(0, -2)$ only
(D) $(-2, 0)$, $(0, -4)$, and $(0, 2)$ only
(E) $(0, -4)$ and $(0, 2)$ only

7. Write the equation of the linear function that passes through the point $(5, -1)$ and has a slope of 0.

(A) $x = 5$ (B) $y = 5$ (C) $x = -1$ (D) $x = 0$ (E) $y = -1$

The following table shows test market data showing the relationship between the purchase price and the demand for a new product (the number of units that people are willing to purchase).

Purchase price, p (in dollars)	10	20	25	40
Number of units, q	100,000	75,000	62,500	25,000

Use this data to answer questions 8 and 9.

8. (*******) Express the price as a function of the number of units.

(A) $p(q) = -\frac{1}{2500}q + 50$

(B) $p(q) = -\frac{1}{2500}q + 10$

(C) $p(q) = -\frac{1}{2500}q + 2500$

(D) $q(p) = -2500p + 100,000$

(E) $q(p) = -2500p + 125,000$

9. Using the function found in the previous question, find the slope of the linear function and give a practical interpretation.

(A) The slope is $-\frac{1}{2500}$. For every increase of one unit in demand, the price decreases by \$2500.

(B) The slope is $-\frac{1}{2500}$. For every \$1 price increase, the number of units demanded decreases by 2500.

(C) The slope is $-\frac{1}{2500}$. For every \$1 price increase, the number of units demanded increases by 2500.

(D) The slope is -2500. For every increase of one unit in demand, the price decreases by \$2500.

(E) The slope is -2500. For every \$1 price increase, the number of units demanded decreases by 2500.

10. Evaluate $g(0)$ given that:

$$g(x)=\begin{cases}-4x+2 & \text{if } x\le 1\\ 5x+1 & \text{if } x>1\end{cases}$$

(A) 2 (B) 1 (C) 0 (D) 1 and 2 (E) None of these

Questions 11 and 12 refer to the following situation: A dentist office is getting ready to order toothbrushes to give to their patients after checkups. The toothbrush company say that it will cost \$48 to have the dentist's name and address printed on the toothbrushes. Each toothbrush will cost \$2.58 if the dentist office orders less than 50 toothbrushes. However, if the dentist orders 50 or more toothbrushes, then each toothbrush will only cost \$1.24.

11. Write a piecewise linear function for the total cost, $C(t)$, in dollars, as a function of the number of toothbrushes ordered, t.

(A) $C(t)=\begin{cases}2.58t & 0\le t<50\\ 1.24t & t\ge 50\end{cases}$

(B) $C(t)=\begin{cases}2.58t+48 & 0\le t<50\\ 1.24t+48 & t\ge 50\end{cases}$

(C) $C(t)=\begin{cases}2.58t & 0\le t<50\\ 1.24(50-t) & t\ge 50\end{cases}$

(D) $C(t)=\begin{cases}2.58t+48 & 0\le t<50\\ 1.24(50-t)+48 & t\ge 50\end{cases}$

12. If the dentist budgets \$110 for the order, what is the maximum number of toothbrushes they can purchase?

The maximum number of toothbrushes the dentist can buy is:

(A) 4 toothbrushes

(B) 24 toothbrushes

(C) 50 toothbrushes

(D) 80 toothbrushes

Questions 13 - 15 refer to the following situation. The value of a printer, in dollars, is given by the function

$$v(t) = \begin{cases} 32,000 - 1200t & \text{if } 0 \le t < 5 \\ 30,000 - 800t & \text{if } t \ge 5 \end{cases}$$

where t represents the number of years since the printer was purchased.

13. What is the value of the printer after 8 years?

(A) \$23,600 (B) \$22,400 (C) \$1,200 (D) \$46,000

14. What is the $t-$intercept of the function and what does it represent in context of the problem? (Round your answer to the nearest year).

(A) $(27,\ 0)$ 27 years after buying the printer, it has been paid off.

(B) $(27,\ 0)$ 27 years after buying the printer, it is worth \$0.

(C) $(38,\ 0)$ 38 years after buying the printer, it has been paid off.

(D) $(38,\ 0)$ 38 years after buying the printer, it is worth \$0.

(E) $(0,\ 30{,}000)$ The printer is worth \$30,000 when it is delivered to the office.

15. What is the $v-$intercept of the function?

(A) $(0,\ 30,000)$
(B) $(0,\ 32,000)$
(C) $(27,\ 0)$
(D) $(38,\ 0)$
(E) $(0,\ 62,000)$

16. (*******) The graph of $y = -\sqrt{x+2}$ can be obtained from the graph of $y = \sqrt{x}$ by

(A) Shifting up 2 units and reflecting over the x-axis.

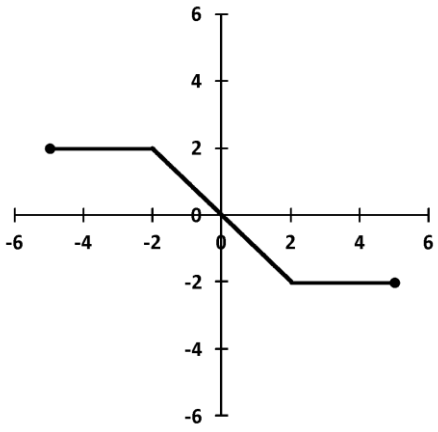
(B) Shifting right 2 units and reflecting over the x-axis.

(C) Shifting left 2 units and reflecting over the x-axis.

(D) Shifting right 2 units and reflecting over the y-axis.

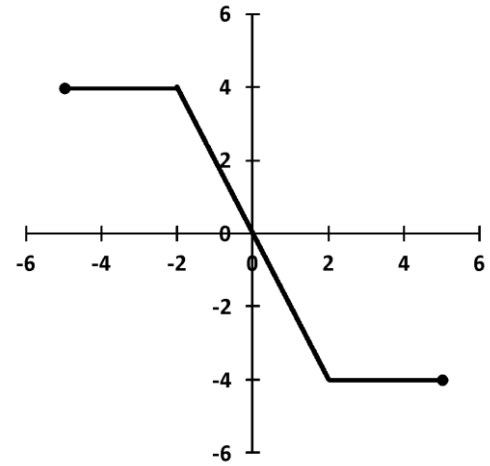
(E) Shifting left 2 units and reflecting over the y-axis.

17. Consider the graph of $y = f(x)$ given below.

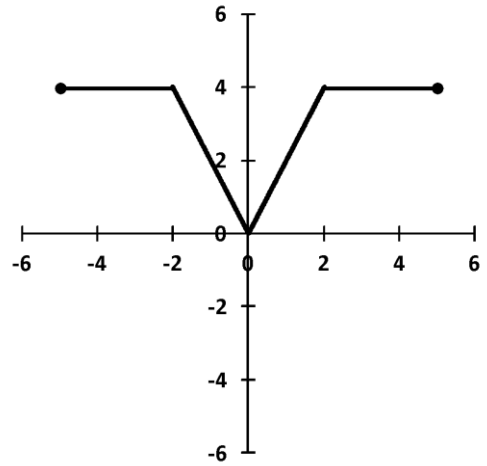


Which one of the following represents the graph of $y = 2f(x)$?

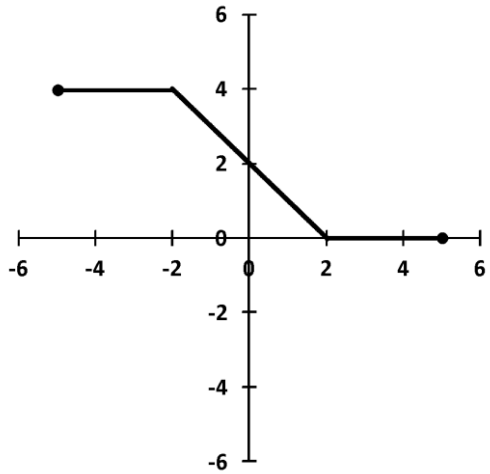
(A)



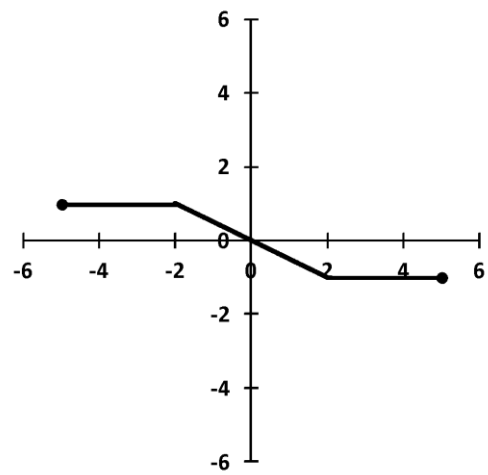
(B)



(C)



(D)



18. (***) Given $f(x) = 2x^2 + 3x + 1$, evaluate $\dfrac{f(h+2) - f(2)}{h}$.

(A) $2h + 11$

(B) $2h + 3$

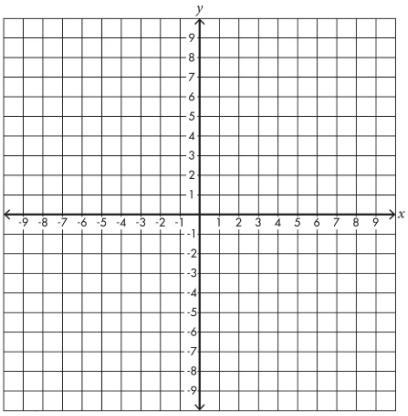
(C) 5

(D) $\dfrac{2h^2 + 3h + 30}{h}$

(E) $\dfrac{2h^2 + 11h + 30}{h}$

Questions 19 and 20 refer to the following function:

Graph the piecewise function: $g(x) = \begin{cases} 3x + 7 & x < -4 \\ -\frac{3}{2}x + 6 & x \geq -2 \end{cases}$



19. (***) Determine the range for the piecewise function $g(x)$.

(A) $(-\infty, -5) \cup (-5, \infty)$
(B) $(-\infty, -5) \cup [-2, 9]$
(C) $(-\infty, -4) \cup [-2, \infty)$
(D) $(-\infty, 9]$
(E) $(-\infty, \infty)$

20. Determine the intercepts of the piecewise function $g(x)$.

(A) (0, 6) and (0, 7) only
(B) (4, 0) and (0, 6) only
(C) (4, 0) and (0, 6) and (0, 7) only
(D) $\left(-\frac{7}{3}, 0\right)$ and (0, 4) and (6, 0) only
(E) $\left(-\frac{7}{3}, 0\right)$ and (4, 0) and (0, 6) and (0, 7) only

Midterm 1 Practice Exam 4 Answers	
Question	Answer
1	A
2	D
3	A
4	D
5	C
6	C
7	E
8	A
9	B
10	A
11	B
12	C
13	A
14	D
15	B
16	C
17	A
18	A
19	D
20	B