Week 1 Friday Homework (1267029)

Due: Fri Sep 10 2010 09:00 PM EDT

Question **1234567891011121314151617181920212 2**

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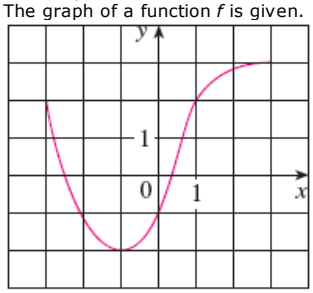
1. Question DetailsSCalcET6 1.1.001. [667289]

The graph of a function f is given.



(a) State the value of $f(1)$.

(b) Estimate the value of $f(2)$.

(c) For what values of x is $f(x) = 2$?

(smaller value)

(larger value)

(d) Estimate the values of x such that $f(x) = 0$.

(smaller value)

(larger value)

(e) State the domain and range of f.

[ ] [ ] domain

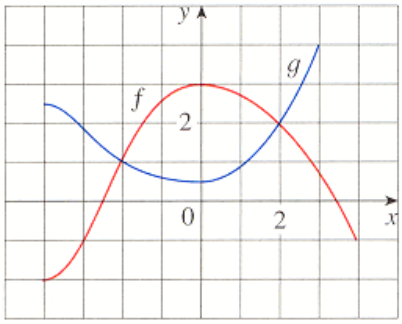
[ ] [ ] range

(f) On what interval is f increasing?

[,]

2. Question DetailsSCalcET6 1.1.002. [657277]

The graphs of f and g are given.



(a) State the values of the functions below.

$f(-4)$ = ____

$g(3)$ = ____

(b) For what values of x is $f(x) = g(x)$?

____ (smaller value)

____ (larger value)

(c) Estimate the solutions of the equation $f(x) = -1$.

x = ____ (smaller value)

x = ____ (larger value)

(d) On what interval is f decreasing?

[____ , ____]

(e) State the domain and range of f.

[____ ____] domain

[____ ____] range

(f) State the domain and range of g.

[____ ____] domain

[____ ____] range

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3. Question DetailsSCalcET6 1.1.021. [1289793]

If $f(x) = 4x^2 - x + 5$, find the following.

(a) $f(2)$ = ____

(b) $f(-2)$ = ____

(c) $f(a)$ = ____

(d) $f(-a)$ = ____

(e) $f(a + 1)$ = ____

(f) $2f(a)$ = ____

(g) $f(2a)$ = ____

(h) $f(a^2)$ = ____

(i) $[f(a)]^2$ = ____

(j) $f(a + h)$ = ____

4. Question DetailsSCalcET6 1.1.022. [1288853]
A spherical balloon with radius r inches has volume defined by the function below. Find a function that represents the amount of air required to inflate the balloon from a radius of r inches to a radius of $r + 1$ inches. (Give the answer in terms of π and r.)

$$V(r) = \frac{4}{3}\pi r^3$$

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5. Question DetailsSCalcET6 1.1.023. [1289645]
Consider the function below.

$f(x) = 4 - 3x - x^2$

Evaluate the difference quotient for the given function. Simplify your answer.

$$\frac{f(1+h) - f(1)}{h}$$

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6. Question DetailsSCalcET6 1.1.025. [1289617]
Consider the function below.

$$f(x) = \frac{1}{x}$$

Evaluate the difference quotient for the given function. Simplify your answer.

$$\frac{f(x) - f(a)}{x - a}$$

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7. Question DetailsSCalcET6 1.1.026. [1288740]
Consider the function below.

$$f(x) = \frac{x+7}{x+5}$$

Evaluate the difference quotient for the given function. Simplify your answer.

$$\frac{f(x) - f(5)}{x - 5}$$

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8. Question DetailsSCalcET6 1.1.027. [667212]
Find the domain of the function. (Enter your intervals in ascending order. If you need to use -∞ or ∞, enter -INFINITY or INFINITY.)

$$f(x) = \frac{x}{4x - 1}$$

? , , ? ∪ ? , , ?

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9. Question DetailsSCalcET6 1.1.030. [656997]
Find the domain of the function. (If you need to use -∞ or ∞, enter -INFINITY or INFINITY.)

$$g(u) = \sqrt{u} + \sqrt{4 - u}$$

? , , ?

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10. Question DetailsSCalcET6 1.1.035. [667241]
Find the domain of the function. (If you need to use -∞ or ∞, enter -INFINITY or INFINITY.)

$f(t) = t^2 - 9t$

? , , ?

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11. Question DetailsSCalcET6 1.1.039. [667274]
Find the domain of the function. (Enter your intervals in ascending order. If you need to use -∞ or ∞, enter -INFINITY or INFINITY.)

$$G(x) = \frac{6x + |x|}{x}$$

? , , ? ∪ ? , , ?

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12. Question DetailsSCalcET6 1.1.045. [1289747]
Find an expression for the function whose graph is the line segment joining the points (2, -2) and (6, 4). (Assume that these points are in the form $(x, f(x))$.)

$f(x) =$, $\leq x \leq$

13. Question DetailsSCalcET6 1.1.051. [1288682]
A rectangle has perimeter 10 m. Express the area of the rectangle as a function of the length (L) of one of its sides.

$A(L)$ = [ ]

State its domain. (If you need to use -∞ or ∞, enter -INFINITY or INFINITY.)
[?] [ ] , [ ] [?]

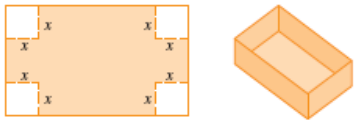
14. Question DetailsSCalcET6 1.1.055. [1288360]
An open rectangular box with volume 7 m^3 has a square base.
(a) Express the surface area of the box as a function of the length (x) of a side of the base.

$SA(x)$ = [ ]

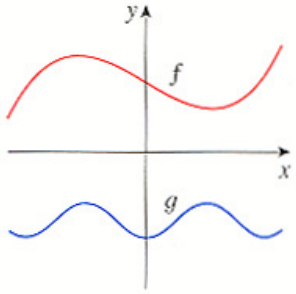
(b) State its domain. (If you need to use -∞ or ∞, enter -INFINITY or INFINITY.)
[?] [ ] , [ ] [?]

15. Question DetailsSCalcET6 1.1.057. [1288167]
A box with an open top is to be constructed from a rectangular piece of cardboard with dimensions 18 in. by 30 in. by cutting out equal squares of side x at each corner and then folding up the sides as in the figure. Express the volume V of the box as a function of x.

V = [ ]



16. Question DetailsSCalcET6 1.1.062. [657096]
Graphs of f and g are shown.



(a) Is f even or odd?
- even
- odd
- neither

(b) Is g even or odd?
- even
- odd
- neither

17. Question DetailsSCalcET6 1.1.063. [667254]
(a) If the point (2, 6) is on the graph of an even function, what other point must also be on the graph?
([ ] , [ ])

(b) If the point (2, 6) is on the graph of an odd function, what other point must also be on the graph?
([ ] , [ ])

18. Question DetailsSCalcET6 1.1.066. [667242]
Determine whether *f* is even, odd, or neither. If you have a graphing calculator, use it to check your answer visually.

$$f(x) = \frac{x^2}{x^4 + 7}$$

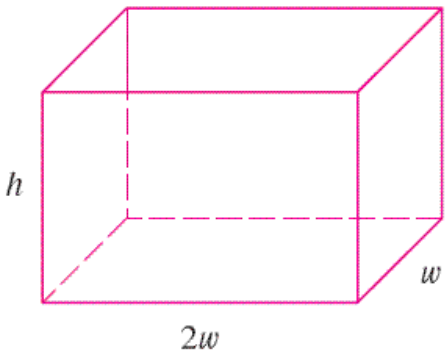
- even
- odd
- neither

19. Question DetailsSCalcET6 1.1.069. [667278]
Determine whether *f* is even, odd, or neither. If you have a graphing calculator, use it to check your answer visually.

$f(x) = 1 + 7x^2 - x^4$

- even
- odd
- neither

20. Question DetailsSCalcET6 1.1.AE.05. [667290]



Video Example

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EXAMPLE 5 A rectangular storage container with an open top has a volume of 18 m^3. The length of its base is twice its width. Material for the base costs \$8 per square meter; material for the sides costs \$7 per square meter. Express the cost of materials as a function of the width of the base.

SOLUTION We draw a diagram as in the figure and introduce notation by letting w and $2w$ be the width and length of the base, respectively, and h be the height.

The area of the base is $(2w)w = 2w^2$, so the cost, in dollars, of the material for the base is [ ]$(2w^2)$. Two of the sides have area wh and the other two have area $2wh$, so the cost of the material for the sides is $7[2($ [ ]$) + 2(2$ [ ]$)]$. The total cost is therefore

$C =$ [ ]$(2w^2) + 7[2($ [ ]$) + 2(2$ [ ]$)]$

$=$ [ ]$w^2 +$ [ ]wh

To express C as a function of w alone, we need to eliminate h and we do so by using the fact that the volume is 18 m^3. Thus

$w(2w)h =$ [ ]

which gives

$$h = \frac{\square}{2w^2} = \frac{\square}{w^2}$$

Substituting this into the expression for C, we have

$$C = \square\, w^2 + \square\, w\left(\frac{\square}{w^2}\right)$$

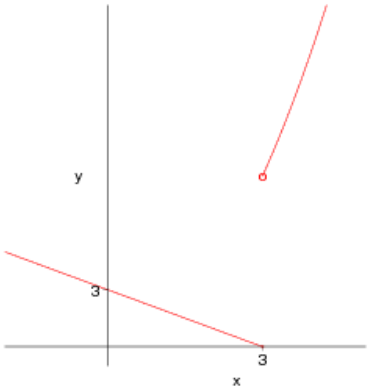
$$= (\square)w^2 + \frac{\square}{w}$$

Therefore the equation

$$C = \square\, w^2 + \frac{\square}{w} \qquad w > 0$$

expresses C as a function of w.

21. Question DetailsSCalcET6 1.1.AE.07. [1288351]



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EXAMPLE 7 A function f is defined below.

$$f(x) = \begin{cases} 3 - x & \text{if } x \leq 3 \\ x^2 & \text{if } x > 3 \end{cases}$$

Evaluate $f(0)$, $f(3)$, and $f(7)$ and sketch the graph.

SOLUTION Remember that a function is a rule. For this particular function the rule is the following: First look at the value of the input x. If it happens that $x \leq 3$, then the value of $f(x)$ is [ ]. On the other hand, if $x > 3$, then the value of $f(x)$ is [ ].

Since $0 \leq 3$, we have $f(0) = 3 - 0 = 3$.
Since $3 \leq 3$, we have $f(3) = 3 - 3 = 0$.
Since $7 > 3$, we have $f(7) = 7^2 = 49$

How do we draw the graph of f ? We observe that if $x \leq 3$, then $f(x)$ = [ ], so the part of the graph of f that lies to the left of the vertical line $x = 3$ must coincide with the line y = [ ], which has slope [ ] and y-intercept [ ]. If $x > 3$, then $f(x)$ = [ ], so the part of the graph of f that lies to the right of the line $x = 3$ must coincide with the graph of y = [ ] which is a parabola. This enables us to sketch the graph in the figure.

22. Question DetailsSCalcET6 1.1.AE.11. [1289601]

Video Example

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EXAMPLE 11 Determine whether each of the following functions is even, odd, or neither even or odd.

(a) $f(x) = x^5 + x$
(b) $g(x) = 1 - x^4$
(c) $h(x) = 2x - x^4$

SOLUTION

(a) $f(-x)$ = ([ ])^5 + ([ ])

= ([ ])$^5 x^5$ + ([ ])

= [ ] = -([ ])

= $-f(x)$ for all x in the domain of $f(x)$

So f is an odd function.

$g(-x)$ = 1 - ([ ])^4

= [ ]

= $g(x)$ for all x in the domain of $g(x)$

So g is even.

(c) $h(-x)$ = 2([ ]) - ([ ])^4

= [ ]

Since there are values of x in the domain of h such that $h(-x) \neq h(x)$ and $h(-x) \neq -h(x)$, we conclude that h is neither even nor odd.

Assignment Details

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