AP Calculus Day 56

Homework Increasing Decreasing Functions

Name _____ Date _____

1. Let f be defined by $f(x) = (x^2 - 1)^3$ for all real numbers x. For what values of x is the function increasing?

   a) $(1, \infty)$ b) $(0, \infty)$ c) $[0, \infty)$

   d) $(-1, 1)$ e) $(-1, 0]$

2. Let $f(x) = (x^2 - 1)^3$. Over what interval is the function decreasing?

   a) $(1, \infty)$ b) $(-\infty, 0)$ c) $(0, \infty)$

   d) $(-1, 1)$ e) $(-1, 0]$

3. Let f be defined by $f(x) = x^2(x - 3)$ for all real numbers x. For what values of x is the function increasing?

   a) $0 < x < 2$

   b) $0 < x < 3$

   c) $0 < x < \infty$

   d) $-\infty < x < 0$ and $x > 2$

   e) $-\infty < x < \infty$

4. Let $f(x) = x^2(x + 9)$. Over what interval is the function decreasing?

   a) $0 < x < 6$

   b) $-6 < x < 0$

   c) $0 < x < \infty$

   d) $-\infty < x < \infty$

   e) $-\infty < x < -6$ and $x > 0$

5. Determine the interval where $f(x) = x^3 - x^6$ is decreasing.

   a) $0 < x < 2$ and $x > \frac{1}{\sqrt[3]{2}}$

   b) $x > \frac{1}{\sqrt[3]{2}}$

   c) $x > \frac{1}{\sqrt{2}}$

   d) $x < \frac{3}{\sqrt{2}}$

   e) $x < \frac{1}{\sqrt{2}}$

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Name _____ Date _____

6. Which of the following statements is true of $f(x) = -x^3 - 6x^2 - 9x - 2$?

a) f is decreasing on $(-3, -1)$

b) f is increasing on $(-3, -1)$

c) f is increasing on $(-\infty, -3)$

d) f is increasing on $(-2, \infty)$

e) f is decreasing for all real values

7. Over which interval(s) is $f(x) = \dfrac{x^2}{x^2 + 4}$ is increasing?

a) $(0, \infty)$ b) $(-2, 2)$

c) $(-\infty, 0)$ d) $(-\infty, \infty)$

e) $(-\infty, 0)$ and $(2, \infty)$

8. Let f be defined by $f(x) = |x + 7|$ for all real numbers x. For what values of x is the function increasing?

a) $(-\infty, -7)$ b) $(-\infty, 7)$ c) $[-7, 0)$

d) $(0, 7)$ e) $(-7, \infty)$

9. Determine the values of x for which the function $f(x) = |x + 9|$ is decreasing.

a) $(-\infty, -9)$ b) $(-\infty, 9)$ c) $[-9, 0)$

d) $(0, 9)$ e) $(-9, \infty)$

10. If $f(x) = \frac{1}{2}\cos 2x$ for $0 \leq x < 2\pi$, determine the interval(s) over which the function is increasing.

a) $0 < x < \dfrac{\pi}{2}$

b) $0 < x < \dfrac{3\pi}{4}$

c) $\dfrac{\pi}{2} < x < \pi$

d) $\dfrac{\pi}{2} < x < \pi$ and $\dfrac{3\pi}{2} < x < 2\pi$

e) $0 < x < \dfrac{\pi}{4}$

AP Calculus Day 56

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11. Let $f(x) = \frac{1}{2}\sin 2x$ for $0 \le x < 2\pi$. Over what interval is the function decreasing?

a) $0 < x < \frac{\pi}{2}$ and $\frac{3\pi}{2} < x < \frac{\pi}{2}$

b) $0 < x < \frac{\pi}{4}$ and $\frac{3\pi}{4} < x < \frac{\pi}{2}$

c) $\frac{\pi}{2} < x < \frac{3\pi}{2}$

d) $\frac{\pi}{4} < x < \frac{3\pi}{4}$ and $\frac{5\pi}{4}, \frac{7\pi}{4}$

e) $0 < x < \frac{\pi}{4}$

12. At which of the five points shown on the graph is $\frac{dy}{dx}$ positive? Choose the *best* answer.

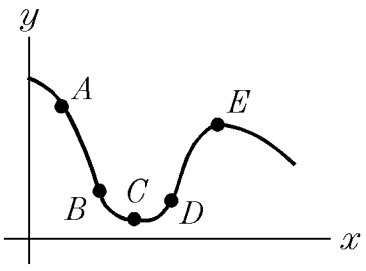
a) A and E

b) D only

c) C only

d) C, D, and E

e) E only



13. A differentiable function f is given by the table shown.

Estimate $f'(4.3)$:

x	3.7	4.3	4.9	5.5	6.1
$f(x)$	1.8	3.4	4.6	6.4	8.4

a) 0.500 b) 2.333 c) 0.429

d) 2.000 e) 3.400

14. A differentiable function f is given by the table shown.

Estimate $f'(5.5)$:

x	3.7	4.3	4.9	5.5	6.1
$f(x)$	1.8	3.4	4.6	6.4	8.4

a) 0.316 b) 3.167 c) 0.300

d) 6.400 e) 0.297

15. The functions f and g are differentiable and have the values shown in the table.

If $A = f - g$ then $A'(6) =$

a) 66 b) 28 c) 0

d) 27 e) 11

x	f	f'	g	g'
0	5	1	−7	$\frac{1}{4}$
2	8	3	−5	1
4	14	9	−3	4
6	26	27	−1	16

AP Calculus Day 56 Homework Increasing Decreasing Functions Hopkins 11/17/2014

1.
Answer: b
CodePath: EAS.APC.D.E.1

2.
Answer: b
CodePath: EAS.APC.D.E.3

3.
Answer: d
CodePath: EAS.APC.D.E.5

4.
Answer: b
CodePath: EAS.APC.D.E.8

5.
Answer: b
CodePath: EAS.APC.D.E.11

6.
Answer: b
CodePath: EAS.APC.D.E.13

7.
Answer: a
CodePath: EAS.APC.D.E.17

8.
Answer: e
CodePath: EAS.APC.D.E.30

9.
Answer: a
CodePath: EAS.APC.D.E.32

10.
Answer: d
CodePath: EAS.APC.D.E.36

11.
Answer: d
CodePath: EAS.APC.D.E.37

12.
Answer: b
CodePath: EAS.APC.D.D.3

13.
Answer: b
CodePath: EAS.APC.D.C.1

14.
Answer: b
CodePath: EAS.APC.D.C.2

15.
Answer: e
CodePath: EAS.APC.D.B.4