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TEST POLICIES (REMINDERS)

If you know that you will be absent on the day of a test, it may be possible to make arrangements with me to take the test on an earlier day. This alternative is not automatic!! Each case will be considered individually. You should notify me as soon as possible regarding planned absences. There are no make-up exams provided for unexpected absences. If you miss an exam for an unexpected absence, the average that you earn on the final will make-up the score for your missed exam. There are no exceptions – do not ask!! When you complete the test, hand it to me personally. You may leave the room at this time. The only questions permitted during an exam are in reference to a misprint, omission, or illegible text. You are responsible for being prepared for the exam. Do not ask me how to do the problem, ask for a hint about how to do the problem, or ask whether or not your answer is correct. Please do not share your misery of being absent for a particular topic, that you forgot how to do the problem, or that you do not have enough time. You will not have the time to figure out problems on exam day. You are to come prepared, polished, and ready to complete the exam. You must turn in your test paper when time is called. I will give a five minute warning before collecting exams. If you do not hand in your paper at collection time, I will not accept it later. It is your responsibility to keep track of time during the exam.

MY HONOR POLICY:

(1)Be prepared to move to a designated seat if requested.
(2)You are not to leave the room without permission.
(3)You must not look anywhere in the room other than at your own test paper.
(4)You may not use or even touch a cell phone. Remember your cell phone is to be silenced in class.
(5)You may not speak to another student.
(6)You may not share materials with another student.
(7)Have all your materials ready. You may not retrieve items from your backpack etc.

Failure to observe all of the policies will result in a zero score for the test or quiz.

The answers are included at the end of the review.

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READ THIS – IMPORTANT!!!!!

TEST #2 MUST BE TAKEN WITHOUT A CALCULATOR

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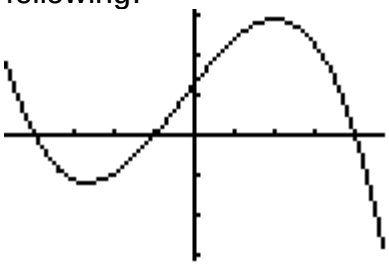
1. TEXT: PAGES 164 – 168 CHAPTER 2 REVIEW
   TEXT: PAGES 248 – 249 CHAPTER 3 REVIEW: 1 – 13, 15 – 17, 21, 24,26, 27, 28, 30, 31, 33 – 42, 47 – 58, 73, 74
   Review all worksheets 2.7 – 3.6.

2. Given the graph of y = g(x), assume that g is defined for all real numbers, answer the following:



Find all values of x at which

A.	g'(x) > 0	B.	g'(x) < 0	C.	g'(x) = 0
D.	g'(x) does not exist – explain.	E.	g'(x) is increasing	F.	g'(x) is decreasing
G.	g"(x) > 0	H.	g"(x) < 0		
I.	g has a local maximum	J.	g has a local minimum		
K.	g is increasing	L.	g has an inflection point		

3. Assume f(x) and g(x) are differentiable functions.

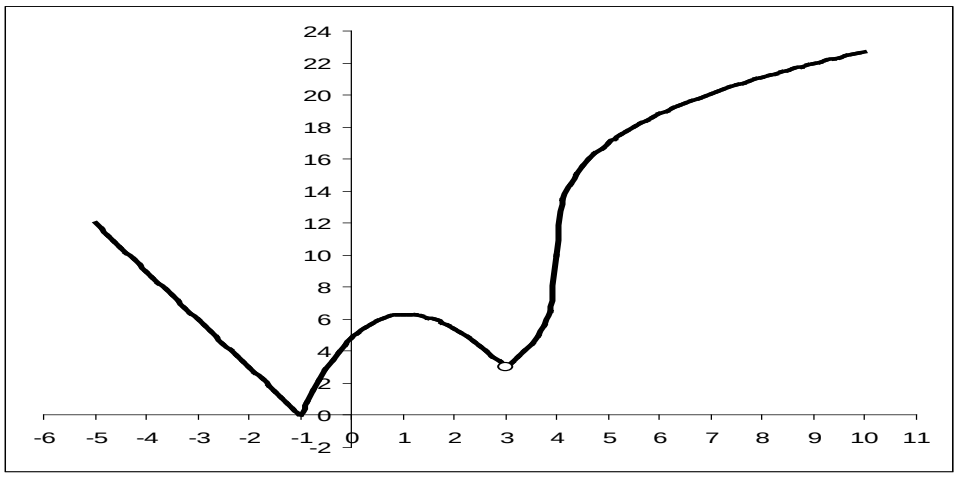
x	f(x)	g(x)	f '(x)	g'(x)
-3	7	-6	-7	7
-2	1	0	-5	5
-1	-3	4	-3	3
0	-5	6	-1	1
1	-5	6	1	-1
2	-3	4	3	-3
3	1	0	5	5

A. Let $h(x) = f(x) \bullet g(x)$, find h'(2).

B. Let $k(x) = \left[\frac{xf(x)}{g(x)}\right]$, find k'(-1).

C. Let $m(x) = 2f(x) - 5\,g(x)$, find m'(3).

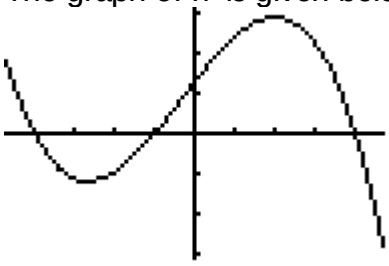
4. Given the graph of y = g(x), assume that g is defined for all real numbers, answer the following:



Find all values of x at which

A. g'(x) > 0
B. g'(x) < 0
C. g'(x) = 0
D. g'(x) does not exist – explain.
E. g'(x) is increasing
F. g'(x) is decreasing
G. g"(x) > 0
H. g"(x) < 0
I. g has a local maximum
J. g has a local minimum
K. g is increasing
L. g has an inflection point

5. The graph of h' is given below.



A. Where is h increasing?
B. Where does h have a local minimum?
C. Where does h have a local maximum?
D. Where is h concave up?
E. Assume that h(0) = -1, sketch a possible graph of h.
F. Sketch a possible graph of h".

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6. Find the derivative, using the rules of differentiation, for each of the following functions:

A. $y = x\,e^x$

B. $y = \dfrac{e^x}{x^2 + 5x}$

C. $h(x) = 4x^5 - \dfrac{3}{x^3} + 2\sqrt{x}$

D. $y = \dfrac{3x - 2}{\sqrt{x} + 1}$

E. Find $f^{(888)}(x)$ for $f(x) = e^x$

F. Find $f^{(886)}$ for $f(x) = \sin x$

G. $y = \cos^2(2x)$

H. $g(x) = 2xe^x + x\sin(3x)$

I. $h(x) = 4x^5 - \dfrac{3}{x^3} + 2\sqrt{x}$

J. $f(x) = \dfrac{x}{\sin x}$

K. $k(x) = 4(3x^4 - 2e^x)^5$

L. $y = e^x \tan(3x^2 - 4x + 9)$

M. Find $f^{(8)}(x)$; $f(x) = e^{2x}$

N. Find $f^{(8)}(x)$; $f(x) = \sin(2x)$

O. $y = 507e^8x + 11^x + \sqrt{99\pi^7} + \sqrt[7]{x^5} + \tan\dfrac{\pi}{4} + \sin e^2 - \sin x - \cos(4x)$

7. The quantity q, in thousands, of Zoom Athletic shoes sold depends on the selling price p. That is, q = f(p). Interpret the following in terms of the problem.

A. $f(150) = 14$

B. $f'(150) = -10$

8. Suppose the amount of a drug left in the body t hours after administration is $A(t) = \dfrac{20}{t + 1}$, where A(t) is in mg. *Give units with your answers.*

A. Find the rate of decrease of the drug at time t.

B. Find the rate of decrease of the drug 4 hours after it is administered.

9. Find dy/dx using implicit differentiation.

A. $x^2 + xy + y^2 = 7$

B. $\sqrt{x} + \sqrt{y} = 3$

C. $x^2y^3 = 1 + ye^{x^2}$

D. $\sin x + \cos y = \sin x \cos y$

10. A. Find the value of dy/dx for 3. A. at the point (1, 2)

B. Find the value of dy/dx for 3. B. at the point (4, 1)

11. Differentiate:

A. $y = x^2 \tan^{-1}(4x)$

B. $f(x) = \sin^2(\cos(\arcsin x^4))$

C. $h(x) = \sin^{-1}(x^2 + \tan x)$

D. $q(x) = \sec x \arccos(3x)$

12. Find an equation of the tangent to the curve $y = e^x(x + 1)$ at x = 0.

13. Find an equation of the normal line to the curve $y = e^x(x + 1)$ at x = 0.

14. Find the point(s) where the tangent line to the curve $y = x/(x^2 + 4)$ has zero slope.

15. Find the x-coordinate(s) of the point(s) where the tangent to the curve $y = (9 - 1/x^2)^2$ has zero slope.

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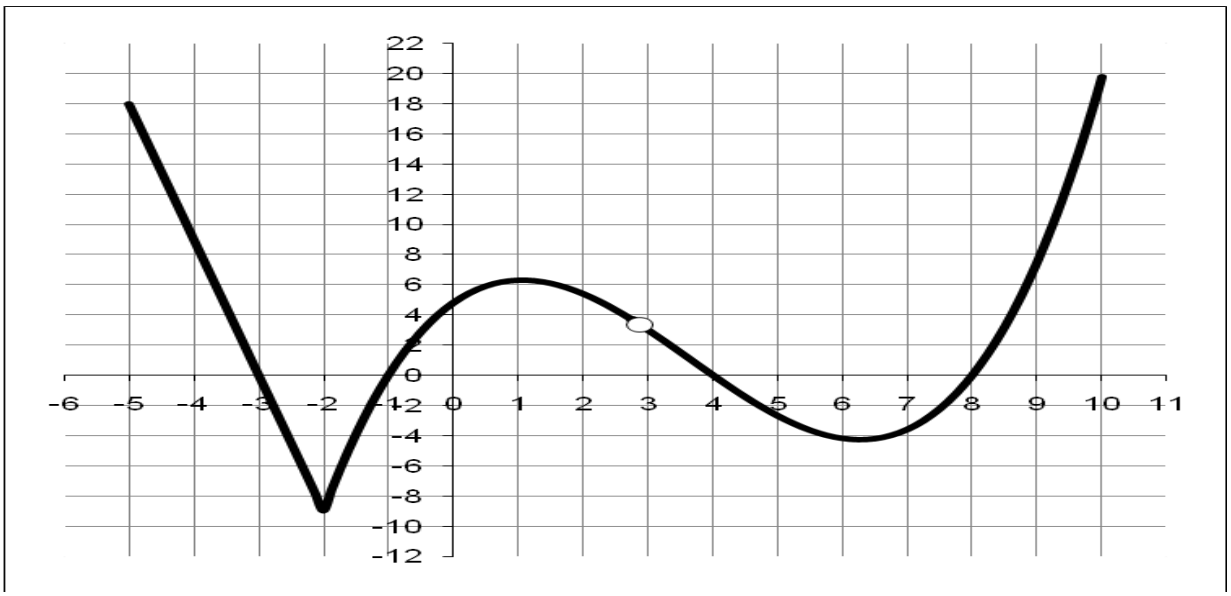
16. The population of a bacteria colony after t hours is $p = 70 + 54t + 2t^2$. Find the growth rate when $t = 3$.

17.



The graph above is the graph of g', the derivative of some function g. Assume that g and g' are defined for all real numbers. Answer the following questions about g'.

A. On what interval(s) is the graph of g increasing?
B. On what interval(s) is the graph of g decreasing?
C. At what value(s) of x does g have a local minimum?
D. At what value(s) of x does g have a local maximum?
E. On what interval(s) is the function g concave downward?
F. On what interval(s) is the function g concave upward?
G. At what value(s) of x does g have an inflection point?

ANSWERS:

1. See text for answers.

2. A. (-2.5, 2) B. $(-\infty, -2.5)$ and $(2, \infty)$ C. x = -2.5, 2
   D. no where E. $(-\infty, 0)$ F. $(0, \infty)$
   G. $(-\infty, 0)$ H. $(0, \infty)$ I. X = 2
   J. x = -2.5 K. (-2.5, 2) L. x = 0
3. A. 21 B. -9/16 C. -15

4. A. (-1, 1) and (3, 11) B. (-5, -1) and (1, 3) C. x = 1
   D. x = -1 corner, x = 3 not continuous, x = 4 vertical tangent
   E. (3, 4) F. (-1, 3) and (4, 11) G. Same as E
   H. Same as F I. x = 1 J. x = -1
   K. same as A I. x = 4

5. A. $(-\infty, -4)$ (-1, 4) B. x = -1 C. x = -4, 4 D. (-2.5, 2)

6. A. $y' = e^x + xe^x = e^x (1 + x)$

B. $y' = \dfrac{e^x\left(x^2 + 5x\right) - e^x\left(2x + 5\right)}{\left(x^2 + 5x\right)^2} = \dfrac{e^x\left(x^2 + 3x - 5\right)}{\left(x^2 + 5x\right)^2}$

C. $h'(x) = 20x^4 + \dfrac{9}{x^4} + \dfrac{1}{\sqrt{x}}$

D. $y' = \dfrac{3\left(\sqrt{x} + 1\right) - \left(3x - 2\right)\dfrac{1}{2\sqrt{x}}}{\left(\sqrt{x} + 1\right)^2} = \dfrac{\dfrac{3x + 6\sqrt{x} + 2}{2\sqrt{x}}}{\left(\sqrt{x} + 1\right)^2} = \dfrac{3x + 6\sqrt{x} + 2}{2\sqrt{x}\left(\sqrt{x} + 1\right)^2}$

E. $f^{(888)}(x) = e^x$ F. $f^{(886)}(x) = -\sin x$

G. $y' = -4\cos(2x)\sin(2x)$ H. $g'(x) = 2e^x(1 + x) + \sin(3x) + 3x\cos(3x)$

I. $h'(x) = 20x^4 + 9/x^4 + 1/x^{1/2}$ J. $f'(x) = (\sin x - x\cos x)/\sin^2 x$

K. $k'(x) = 20(12x^3 - 2e^x)(3x^4 - 2e^x)^4$

L. $y' = e^x\tan(3x^2 - 4x + 9) + e^x\sec^2(3x^2 - 4x + 9)(6x - 4)$

M. $f^{(8)}(x) = 2^8e^{2x}$ N. $f^{(8)}(x) = 2^8\sin(2x)$

O. $y' = 507e^8 + (\ln 11)11^x + 0 + \dfrac{5}{7}x^{-\frac{2}{7}} + 0 + 0 - \cos x + 4\sin(4x)$

7. A. When the shoes are priced at \$150 per pair, the quantity sold will be 14,000.
B. When the shoes are priced at \$150 per pair, the rate of change of the quantity sold decreases by 10,000 pairs per \$1 increase in price.

8. A. $A'(t) = \dfrac{-20}{\left(t + 1\right)^2}$ B. A'(4) = -0.8 mg/hour

9. A. $x^2 + xy + y^2 = 7$

$2x + x'y + xy' + 2yy' = 0 \rightarrow 2x + y + xy' + 2yy' = 0 \rightarrow y'(x + 2y) = -2x - y$

$\rightarrow y' = (-2x - y)/(x + 2y)$

B. $y' = -\dfrac{\sqrt{y}}{\sqrt{x}}$ C. $y' = \dfrac{2xye^{x^2} - 2xy^3}{3x^2y^2 - e^{x^2}}$

D. $\sin x + \cos y = \sin x\cos y$

$\cos x - \sin y\,(y') = \cos x\cos y + \sin x\,(-\sin y\,(y'))$

$y'[-\sin y + \sin x\sin y] = \cos x\cos y - \cos x$

$y' = [\cos x\cos y - \cos x]/[-\sin y + \sin x\sin y]$ $y' = \dfrac{\cos x\cos y - \cos x}{\sin x\sin y - \sin y}$

10. A. -4/5 B. -½

11. A. $y' = 2x \tan^{-1}(4x) + \dfrac{4x^2}{1 + 16x^2}$

B. $f'(x) = 2\sin(\cos(\arcsin(x^4)))\cos(\cos(\arcsin(x^4)))(-\sin(\arcsin(x^4))) \bullet \dfrac{4x^3}{\sqrt{1 - x^8}}$

$f(x) = \sin^2(\cos(\arcsin x^4))$

$f'(x) = 2\sin(\cos(\arcsin x^4))(\sin(\cos(\arcsin x^4)))'$

$= 2\sin(\cos(\arcsin x^4))(\cos(\cos(\arcsin x^4)))((\cos(\arcsin x^4))'$

$= 2\sin(\cos(\arcsin x^4))(\cos(\cos(\arcsin x^4)))((-\sin(\arcsin x^4))(\arcsin x^4)'$

$= 2\sin(\cos(\arcsin x^4))(\cos(\cos(\arcsin x^4)))((-\sin(\arcsin x^4))\left(\dfrac{1}{\sqrt{1 - \left(x^4\right)^2}}\right)(x^4)'$

$= 2\sin(\cos(\arcsin x^4))(\cos(\cos(\arcsin x^4)))((-\sin(\arcsin x^4))\left(\dfrac{1}{\sqrt{1 - \left(x^4\right)^2}}\right)(4x^3)$

C. $h'(x) = \dfrac{2x + \sec^2 x}{\sqrt{1 - \left(x^2 + \tan x\right)^2}}$

D. $q'(x) = \sec x \tan x \arccos(3x) - \dfrac{3 \sec x}{\sqrt{1 - 9x^2}}$

12. $y = 2x + 1$ 13. $y = -\frac{1}{2}x + 1$ 14. $(2, \frac{1}{4}), (-2, -\frac{1}{4})$ 15. $x = \pm\dfrac{1}{3}$

16. 66 bacteria per hour

17. (Answers given to the nearest integer.)
A. $(-\infty, -3)$, $(-1, 3)$, $(3, 4)$ and $(8, \infty)$ because g' > 0
B. $(-3, -1)$ and $(4, 8)$ because g' < 0
C. At x = -1, 8 because g' changes sign from negative to positive at x = -1, 8.
D. At x = -3, 4 because g' changes sign from positive to negative at x = -3, 4.
E. On $(-\infty, -2)$, $(1, 3)$ and $(3, 6)$, because g' is decreasing so g" < 0.
F. On $(-2, 1)$ and $(6, \infty)$, because g' is increasing so g" > 0.
G. x = -2, 1, 6, g' changes direction, g" is either zero or undefined and g" changes sign.