

Name: _____

Math 105: Fall 2013

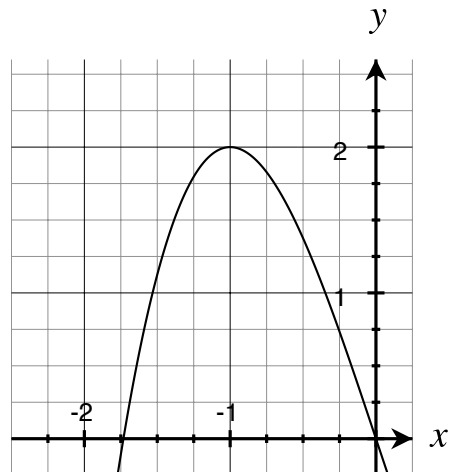
Exam 1 (version φ): October 4

Correct answers accompanied by incorrect or incomplete work will not receive full credit.

1. (6 points) A portion of the graph of $g(x) = x^3 - 3x$ is shown

(a) Draw the line tangent to $g(x)$ at $x = -1.5$.

(b) Compute the slope of your tangent line.



2. (8 points) Let $g(x) = x^3 - 3x$. Use the limit definition of derivative to find $g'(-1.5)$.

(Hint: $(a + b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$.)

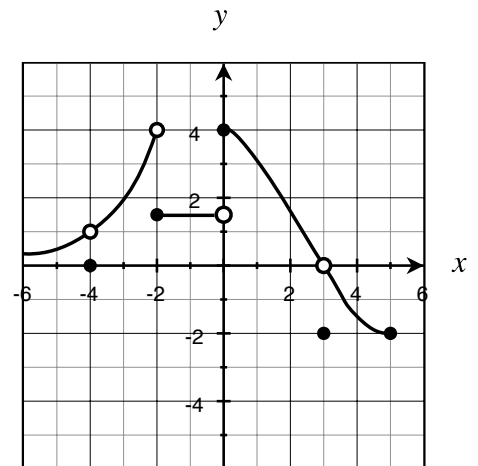
3. (6 points) Let $g(x) = x^3 - 3x$. Use the power rule to find $g'(-1.5)$.

4. (4 points) Let $H(t)$ be the height (in meters) of a hot air balloon t minutes after take off. What does the statement $H'(60) = -2.4$ mean in this context? Include units in your answer.

5. (4 points each) The graph of $f(x)$ is given. Evaluate the following (assume the tickmarks occur at 1, 2, etc).

(a) $f(-4)$

(b) $\lim_{x \rightarrow -4} f(x)$



6. (10 points) Let $k(x) = |x|$.

(a) Find $\lim_{x \rightarrow 0} k(x)$. Justify your answer.

(b) Find $\lim_{x \rightarrow 0} k'(x)$. Justify your answer.

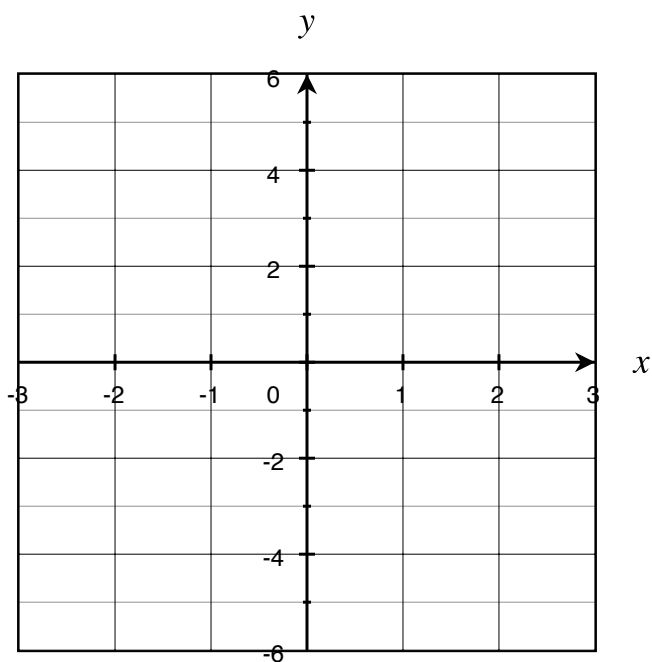
7. (14 points) Let $h(x) = 4x^7 + \frac{12}{x^7} - \sqrt[5]{x} + \cos 12$.

(a) Find the derivative of h .

(b) Find the antiderivative of h .

8. (14 points) Assume that f is a continuous function defined on the closed interval $[-3, 3]$ such that $f(-3) = -1$ and $f(3) = 3$. Furthermore, assume that f' and f'' are continuous on $(-3, 3)$ and that the information in the table below is known about these functions.

x	$-3 \leq x < -1$	-1	$-1 < x < 0$	0	$0 < x < 1$	1	$1 < x \leq 3$
$f'(x)$	+	0	+	+	+	0	-
$f''(x)$	-	0	+	0	-	-	-

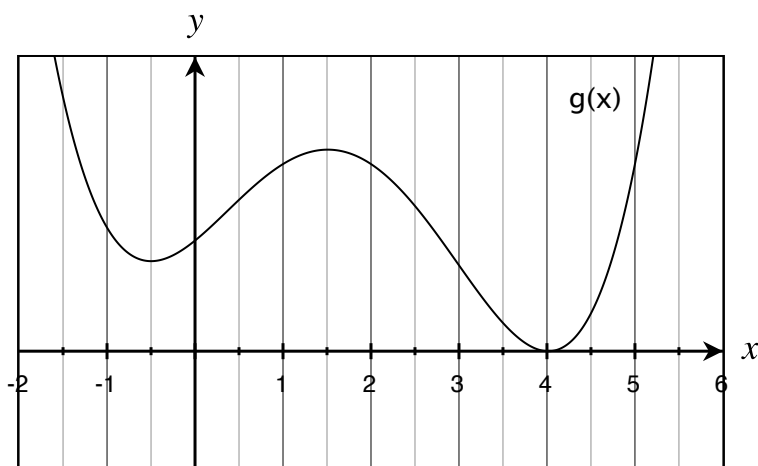


9. (8 points) Assume $y = \frac{1}{2}x - 3$ is tangent to $f(x)$ at $x = 7$.

(a) Find $f(7)$. Justify your answer.

(b) Find $f'(7)$. Justify your answer.

10. (18 points) The graph below is a graph of $g(x)$. Let $G(x)$ be an antiderivative of $g(x)$.



(a) Is it possible that $g''(1.5) = 2$? Justify your answer.

(b) Is $G(0) > G(1)$? Justify your answer.

(c) On what interval(s) is $G(x)$ concave down? Justify your answer.

11. (4 points) Who do you think will win the World Series?

- (a) Atlanta Braves (b) Boston Red Sox (c) Detroit Tigers (d) Los Angeles Dodgers
(e) Oakland Athletics (f) Pittsburgh Pirates (g) St. Louis Cardinals (h) Tampa Bay Rays