Math 141

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Fall 2014

Name: . . . .

Student ID (last 6 digits): XXX-. . . . .

TA recitation (check one):

James Scott:	☐	Margaret Wieczorek:	☐
Andrew Starnes:	☐	John Cummings:	☐

MIDTERM 1

You have 50 minutes to complete the exam. Do all work on this exam, i.e., on the page of the respective assignment. Indicate clearly, when you continue your solution on the back of the page or another part of the exam.

Write your name and the last six digits of your student ID number on the top of this page. Check that no pages of your exam are missing. This exam has 6 questions and 10 printed pages (including this one and a page for scratch work in the end).
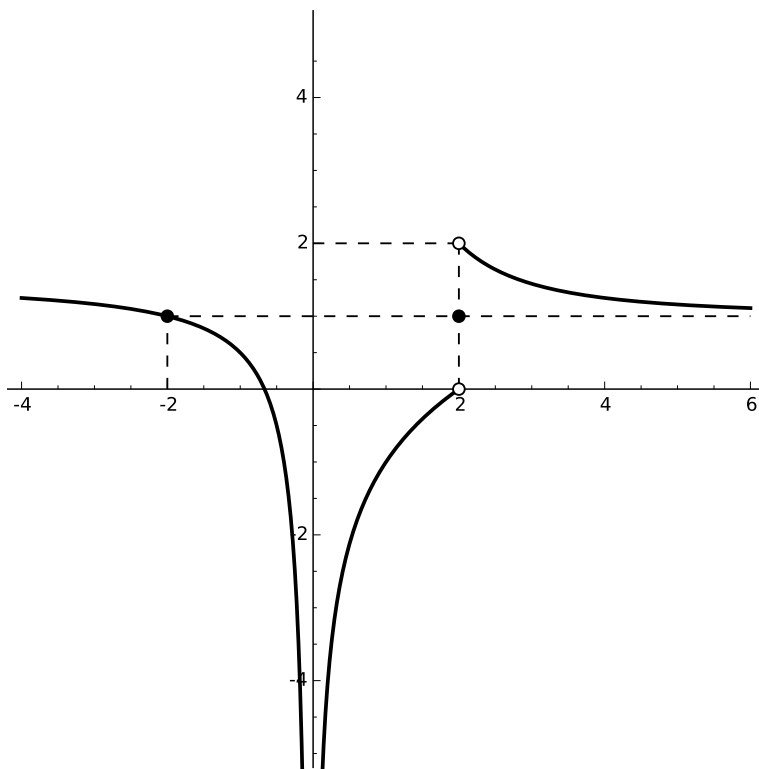
No books, notes or calculators are allowed on this exam!

Show all work! (Unless I say otherwise.) Correct answers without work will receive **zero**. Also, **points will be taken from messy solutions**.

Good luck!

Question	Max. Points	Score
1	12	
2	28	
3	15	
4	15	
5	15	
6	15	
Total	100	

1) [12 points] Consider the graph $y = f(x)$ below:

Find [no need to justify]:

(i) $f(2) =$

(ii) $\lim\limits_{x \to -2} f(x) =$

(iii) $\lim\limits_{x \to 0} f(x) =$

(iv) $\lim\limits_{x \to 2^-} f(x) =$

(v) $\lim\limits_{x \to 2^+} f(x) =$

(vi) $\lim\limits_{x \to \infty} f(x) =$

2

2) [28 points] Compute the following limits. [Show work in all!]

(a) $\lim\limits_{x \to 1} \dfrac{x^2 + x - 2}{x^2 - 2x + 1}$

(b) $\lim\limits_{x \to 4} \dfrac{x - 4}{\sqrt{x} - \sqrt{8 - x}}$

(c) $\displaystyle\lim_{x\to\infty} \frac{2\mathrm{e}^{3x} - 1}{1 - \mathrm{e}^x - 3\mathrm{e}^{3x}}$

(d) $\displaystyle\lim_{x\to 1^+} \frac{x + 2}{x^2 - 1}$

3) [15 points] Give the equation of the line tangent to the graph of $f(x) = \cos(2x)$ at $x = 0$. [You *cannot* use any derivative formula we haven't seen in class yet!]

4) [15 points] Let

$$\lim_{x\to 1} f(x) = 3, \qquad \lim_{x\to 1} g(x) = -2, \qquad \lim_{x\to 1} h(x) = +\infty.$$

Compute the following limits. [If a limit does not exist and is neither $+\infty$ nor $-\infty$, write DNE. You do not need to show work here.]

(a) $\lim_{x\to 1} f(x) - g(x) =$

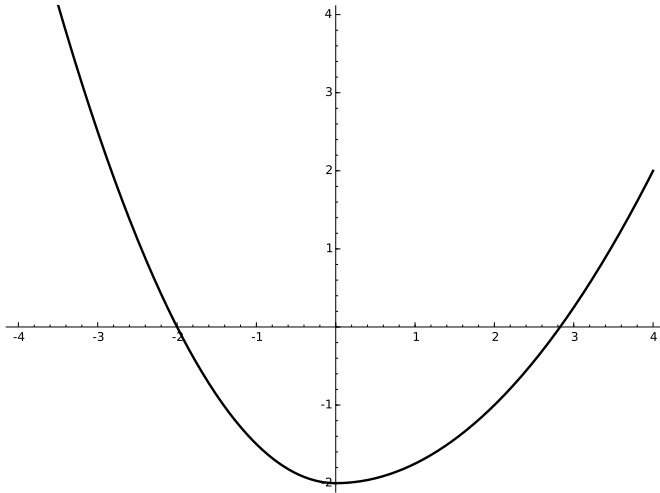(b) $\lim_{x\to 1} g(x) \cdot h(x) =$

(c) $\lim_{x\to 1} f(x)/h(x) =$

(d) $\lim_{x\to 1} h(x)/g(x) =$

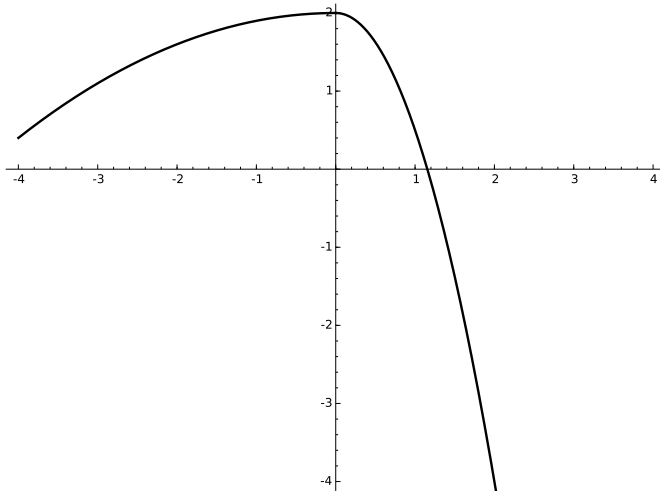(e) $\lim_{x\to 1} \arctan(x - h(x)) =$

5) [15 points] Give a [finite] closed interval in which we have a solution to $3^x = x^2$. [Justify!]

6) [15 points] Let $f(x)$ be a function for which $f'(-2) = 2$, $f'(0) = 0$ and $f'(2) = -1$. Mark the option below that could represent the graph of this function. [You do not *have* to justify, but in that case, we *cannot* give partial credit! If you do write an explanation for your choice, we *can*.]
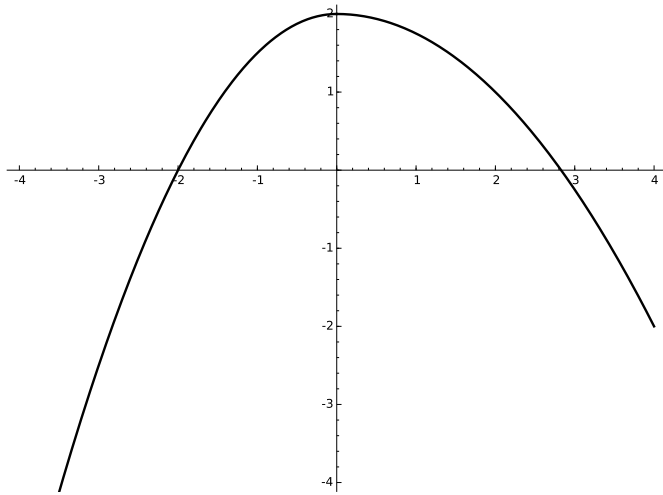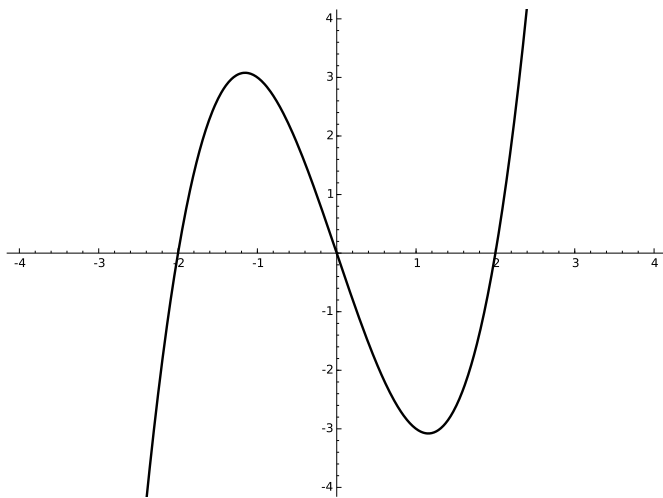
(a)

(b)

(c)

(d)

(e) None of the above.

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Scratch: