Name _____ Signature _____

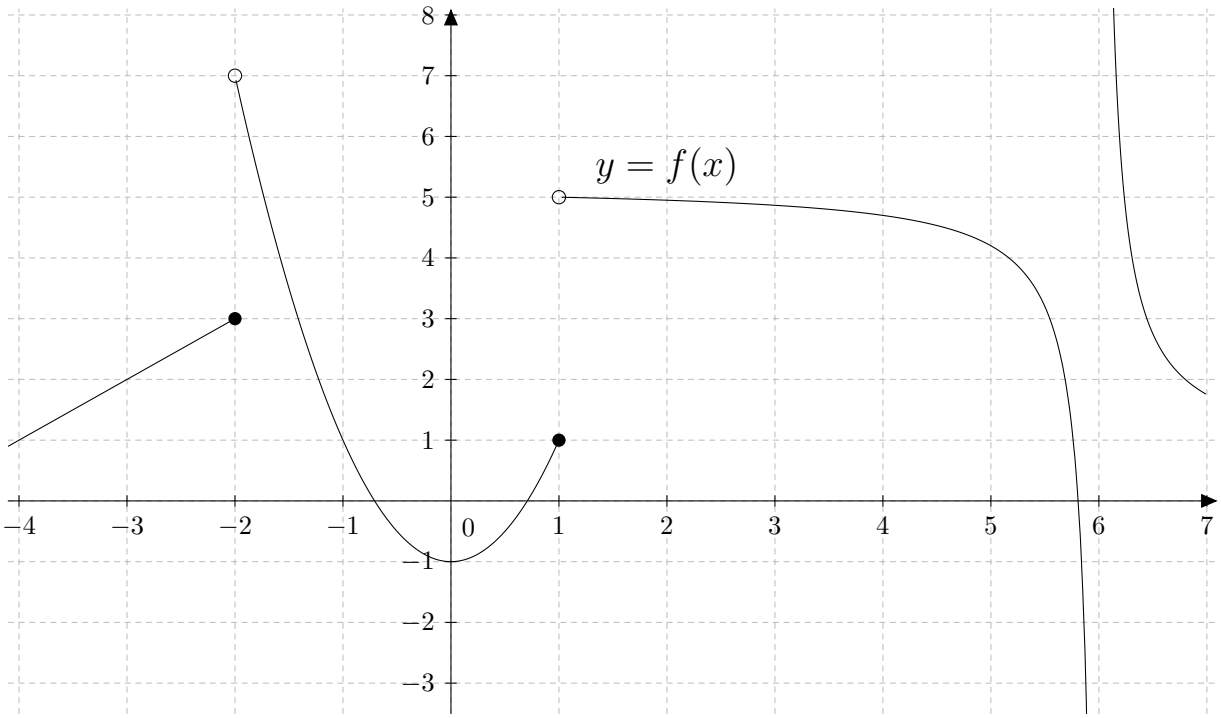
Math 220 – Exam 1 – September 17, 2014

1. (4 points) Write an equation for the line with slope 5 that passes through the point $(3, 1)$.

2. (5 points) Find $\lim_{x \to -\infty} \dfrac{6x^8 + 2x^3 + 1}{3x^8 + 4x^7 + x^2}$.

3. (7 points) Find the constant c that makes the following function continuous.

$$q(x) = \begin{cases} x^2 + 2 & \text{if } x > 2 \\ x + c & \text{if } x \leq 2 \end{cases}$$



4. (3 points each) Consider the graph of $y = f(x)$ above. State the value of each of the below quantities. If the quantity does not exist, write "does not exist".

A. $\lim_{x \to -1} f(x)$

B. $\lim_{x \to -2^-} f(x)$

C. $\lim_{x \to -2^+} f(x)$

D. $\lim_{x \to 6^-} f(x)$

E. $\lim_{x \to 1^-} f(x)$

F. $\lim_{x \to 1^+} f(x)$

G. $\lim_{x \to 1} f(x)$

H. $f(1)$

5. (7 points each) Evaluate the following limits.

A. $\lim_{x \to 0} \dfrac{7\sin(x)}{x}$

B. $\lim_{x \to 4} \dfrac{x-4}{x^2-5x+4}$

C. $\lim_{x \to 9} \dfrac{3-\sqrt{x}}{9-x}$

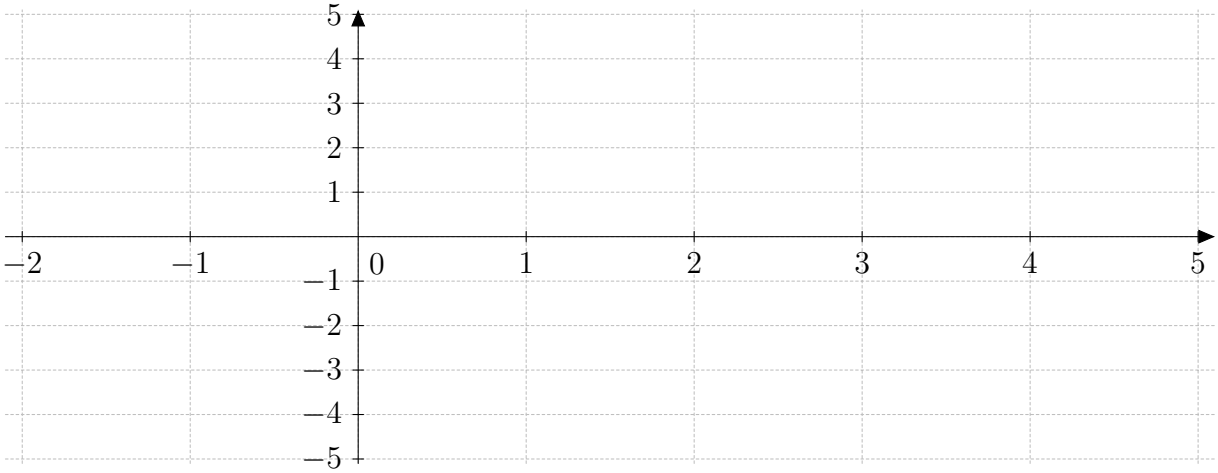
D. $\lim_{x \to 0} x^2 \cos\left(\dfrac{1}{x}\right)$

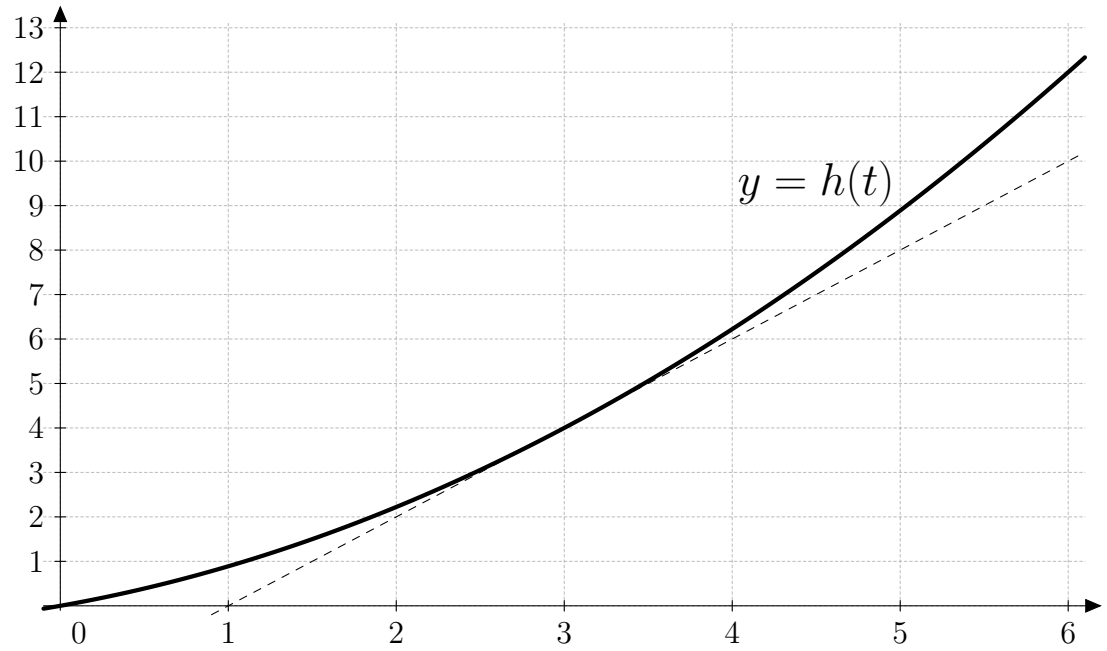
x	1.9	1.99	1.999	1.9999	2.0001	2.001	2.01	2.1
$k(x)$	4.89	4.993	4.998	4.99992	5.00023	5.004	5.07	5.12

6. (4 points) Based on the table above, estimate $\lim_{x \to 2} k(x)$.

7. (7 points) Show that $x^7 + x^2 - 1 = 0$ has a solution in the interval $[0, 1]$.

8. (7 points) Sketch the graph of $y = 3\cos(\pi x) - 1$.





9. (4 points each) A piece of paper is blowing in the wind. The function $h(t)$ graphed above denotes the height in feet of the paper after t seconds. The dotted line above is the tangent line to $y = h(t)$ at $t = 3$ seconds.

(a) Find the average velocity of the paper over the time interval $[3, 6]$ seconds.

(b) Find the instantaneous velocity of the paper at time $t = 3$ seconds.

10. (6 points) Given that $\lim_{x \to 1} g(x) = 4$ and $\lim_{x \to 1} m(x) = 2$, find $\lim_{x \to 1} \dfrac{g(x) + x}{m(x)}$.