Final Exam Review: Worksheet 3

1. Find k such that the function f is continuous everywhere:

$$f(x) = \begin{cases} x^2 + 2x, & \text{if } x \leq k \\ 2x^2 + 2x - 1, & \text{if } x > k. \end{cases}$$

2. Find k such that the function f is continuous everywhere:

$$f(x) = \begin{cases} x^2 + x - 2k, & \text{if } x \leq 2 \\ 6x + k, & \text{if } x > 2. \end{cases}$$

3. Find k such that $y = -4x + k$ is a tangent line to the graph of $f(x) = x^3 + 3x^2 - x + 1$.
4. Find k such that $y = 2x + 6$ is a tangent line to the graph of $f(x) = x^2 - 2x + k$ at the point where $x = 2$.
5. Find k such that

$$\int_k^{k+1} (2x+1)\,dx = 2.$$

6. Find k such that the average value of

$$f(x) = \frac{1}{\sqrt{x}} + 2x - k$$

on the interval $[0, k]$ is equal to 8.
7. Find k such that

$$\int_1^2 \frac{(x+k)(x-k)}{2x^2}\,dx = 0.$$

8. Find k such that

$$\int_{-k}^{k} \frac{(x-1)(x+3)}{x^4}\,dx = 0.$$

9. Find all values c which satisfy the conclusion of the Mean Value Theorem for

$$f(x) = x^3 + 2x^2 - x$$

on the interval $[-1, 2]$.
10. Let f be a function with first derivative given by

$$f'(x) = \frac{2x^2 - 5}{x^2}$$

for all $x > 0$. Given that $f(1) = 7$ and $f(5) = 11$, what value $c \in (1, 5)$ satisfies the conclusions of the Mean Value Theorem for f on the interval $[1, 5]$?
11. Suppose f is continuous on $[0, 2]$ and has values:

x	0	1	2
$f(x)$	1	k	2

The equation $f(x) = \frac{1}{2}$ must have at least two solutions in the interval $[0, 2]$ if k is:

a). 0; b). 1/2; c). 1; d). 2; e). 3.

12. Selected values of a continuous function g are below:

x	0	2	5	9	11
$g(x)$	1	2.8	1.7	1	3.4

For $0 \leq x \leq 11$, what is the minimum number of times $g(x) = 2$?

a). One; b). Two; c). Three; d). Four; e). Five.