

**Fall 2011**

1. Find a value for  $k$  so that the function

$$f(x) = \begin{cases} 3x - k & \text{if } x \leq 1 \\ \frac{x^2 - 3x + 2}{x - 1} & \text{if } x > 1 \end{cases}$$

will be continuous at  $x = 1$ .

- A)  $-3$       B)  $-2$       C)  $-1$       D)  $0$   
E)  $\frac{1}{2}$       F)  $2$       G)  $3$       H)  $4$

**Fall 2010**

5. Which of the following **MUST** contain a zero of the function  $f(x) = \frac{1}{4}x^3 - x^2 + x - 1$ ?

- A)  $(-1, 0]$
- B)  $(0, 1)$
- C)  $(1, 2]$
- D)  $(2, 3)$
- E)  $(3, 4)$
- F)  $(4, 5)$
- G)  $(-2, -1)$
- H)  $(-3, -2)$

**Spring 2010**

5. Find the value of the limit  $\lim_{x \rightarrow \infty} \frac{4x^2 - 3x + 5}{7 + 2x - 2x^2}$ .

a.  $-\frac{1}{2}$

e.  $-1$

b.  $1$

f.  $-\frac{4}{7}$

c.  $2$

g.  $-2$

d.  $\frac{1}{2}$

h.  $\frac{4}{7}$

**Fall 2009**

6. At what value(s) of  $x$  is the function  $f(x) = \begin{cases} x^2 + 4x + 5 & \text{if } x < -2 \\ \frac{1}{2}x & \text{if } -2 \leq x \leq 2 \\ 1 + \sqrt{x-2} & \text{if } x > 2 \end{cases}$  discontinuous?
- a) -2      b) 0      c) -2, 0, and 2      d) -2 and 0  
e) 2      f) -2 and 2      g) 0 and 2      h)  $f$  is continuous everywhere

**Spring 2008**

11. Let  $f$  be a continuous function on the closed interval  $[-3, 6]$ . If  $f(-3) = -1$  and  $f(6) = 3$ , then the Intermediate Value Theorem guarantees that
- (a)  $f(0) = 0$
  - (b)  $f'(c) = \frac{4}{9}$  for at least one  $c$  between  $-3$  and  $6$
  - (c)  $-1 \leq f(x) \leq 3$  for all  $x$  between  $-3$  and  $6$
  - (d)  $f(c) = 1$  for at least one  $c$  between  $-3$  and  $6$
  - (e)  $f(c) = 0$  for at least one  $c$  between  $-1$  and  $3$

**For full credit, provide an explanation.**

**Fall 2005**

1. Compute the limits :

(i) 
$$\lim_{h \rightarrow 0} \frac{\sqrt{4+h} - \sqrt{4-h}}{2h}$$

(ii) 
$$\lim_{x \rightarrow \infty} \frac{\sqrt{16x^4 + 12x^2 - 8}}{2x^2 - 10}$$

**Hand In HW #3  
Answer Section**

**Fall 2011 # 1: H**

**Fall 2010 # 5: E**

**Spring 2010 # 5: G**

**Fall 2009 # 6: A**

**Spring 2008 # 11: D**

**Fall 2005 # 1: (i)  $\frac{1}{4}$  (ii) 2**