MATH 2554 : Exam 1 Review

Review Problems

Here are some problems NOT covered in class I recommend looking at. I suggest starting with the non-bold ones then go to the bold ones if you want a challenge!

- Section 2.3 : 41, 49, **50**, 56, **61**, 68
- Section 2.4 : 29, 38
- Section 2.5 : 31, 46, **78**
- Section 2.6 : 40, 86
- Section 3.1 : 23, 42
- Section 3.2 : 24a, 26a, **30a**

Here are some problems I DID cover in class. I especially recommend reviewing over the bold ones.

- Section 2.1 : **6**
- Section 2.2 : 3, **17**, 51
- Section 2.3 : 22, 23, 25, 36, 37, 38, **40**, 49, **57**, **67**, 62, **88**
- Section 2.4 : 21, 27, **24**, **30**, 48
- Section 2.5 : 18, **29**, **33**, 38, 47, **78**, **80**
- Section 2.6 : 17, 22, **28**, 39, **87**
- Section 2.7 : 11, **16**
- Section 3.1 : 17, 32
- Section 3.2 : 20, 25a, 28a, 29a

These should by no means be considered all inclusive, as I do not write the exam. Your professor will recommend going over all problems assigned as homework, these are only problems I especially recommend!

Nifty rules

Limit of a Function : Suppose the function f is defined for all x near a except possibly at a. If $f(x)$ is arbitrarily close to L (as close to L as we like) for all x sufficiently close (but not equal) to a we say :

$$\lim_{x\to a} f(x) = L$$

Continuity Checklist : A function f will be continuous at a if $\lim_{x\to a} f(x) = f(a)$, which can be expanded to the following checklist which should be followed in order to determine continuity :

1. $f(a)$ is defined (a is in domain of f)
2. $\lim_{x\to a} f(x)$ exists
3. $\lim_{x\to a} f(x) = f(a)$

Intermediate Value Theorem : Suppose f is continuous on the interval $[a, b]$ and L is a number strictly between $f(a)$ and $f(b)$. Then there exists at least one number c in (a, b) satisfying $f(c) = L$

Derivative of a Function at a Point :

1. $f'(a) = \lim_{x\to a} \dfrac{f(x) - f(a)}{x - a}$
2. $f'(a) = \lim_{h\to 0} \dfrac{f(a+h) - f(a)}{h}$

Definition of the Derivative :

$$f'(x) = \lim_{h\to 0} \frac{f(x+h) - f(x)}{h}$$

Random Tips

1. $\lim_{x\to -a} f(x) \not\equiv \lim_{x\to a^-} f(x)$ as a^- implies a left-sided limit, don't make this simple mistake!
2. To follow correct limit notation, <u>do not</u> plug in your values with your limit sign still attached, e.g. $\lim_{x\to 5} 3x + 5 = 3(5) + 5 = 20$ NOT $\lim_{x\to 5} 3x + 5 = \lim_{x\to 5} 3(5) + 5 = 20$
3. Remember that vertical asymptotes $x = a$ occur when $\lim_{x\to a} f(x) = \pm\infty$, $\lim_{x\to a^-} f(x) = \pm\infty$, or $\lim_{x\to a^+} f(x) = \pm\infty$ while a horizontal asymptote $y = L$ occurs at $\lim_{x\to -\infty} f(x) = L$ or $\lim_{x\to \infty} f(x) = L$