MATH 220 **Test 1** **Spring 2019**

Name _____ **NetID** _____

UIN _____

Circle your TA discussion section.

- ▷ **AD1**, TR 9:00-10:50, Ran Ji
- ▷ **AD2**, TR 1:00-2:50, Cassie Christenson
- ▷ **AD3**, TR 11:00-12:50, Dana Neidinger
- ▷ **ADA**, TR 8:00-8:50, Eion Blanchard
- ▷ **ADB**, TR 9:00-9:50, Eion Blanchard
- ▷ **ADC**, TR 10:00-10:50, Yuxuan "Yuki" Zhang
- ▷ **ADD**, TR 11:00-11:50, Stathis Chrontsios
- ▷ **ADE**, TR 12:00-12:50, Kesav Krishnan
- ▷ **ADF**, TR 1:00-1:50, Souktik Roy
- ▷ **ADG**, TR 2:00-2:50, Gidon Orelowitz
- ▷ **ADH**, TR 3:00-3:50, Mina Nahvi
- ▷ **ADJ**, TR 9:00-9:50, Yuxuan "Yuki" Zhang
- ▷ **ADK**, TR 10:00-10:50, Souktik Roy
- ▷ **ADL**, TR 11:00-11:50, Gidon Orelowitz
- ▷ **ADM**, TR 12:00-12:50, Vincent Villalobos
- ▷ **ADN**, TR 1:00-1:50, Kesav Krishnan
- ▷ **ADO**, TR 2:00-2:50, Stathis Chrontsios
- ▷ **ADQ**, TR 4:00-4:50, Mina Nahvi
- ▷ **ADR**, TR 10:00-10:50, Vincent Villalobos

- Sit in your assigned seat (circled below).
- Do not open the test or write formulas upon it until I say *START*.
- Remove smartwatches and turn off all electronic devices.
- Put away all items except a pen/pencil and an eraser.
- Remove hats and sunglasses.
- There is no partial credit on multiple-choice questions. For all other questions, you must show sufficient work to justify your answer.
- While the test is in progress, we will not answer questions concerning the test material.
- Do not leave early unless you are at the end of a row.
- Quit working and close this test booklet when I say *STOP*.
- Quickly turn in your test to me or a TA and show your Student ID.

310	311	312	R	313	314	315	316	317	318	—	—	319	320	321	322	323	R	324	325	326
291	292	293	Q	294	295	296	297	298	299	300	301	302	303	304	305	306	Q	307	308	309
272	273	274	P	275	276	277	278	279	280	281	282	283	284	285	286	287	P	288	289	290
253	254	255	O	256	257	258	259	260	261	262	263	264	265	266	267	268	O	269	270	271
234	235	236	N	237	238	322	240	241	242	243	244	245	246	247	248	249	N	250	251	252
216	217	218	M	219	220	221	222	223	224	225	226	227	228	229	230		M	231	232	233
199	200	201	L	202	203	204	205	206	207	208	209	210	211	212	213		L	214	215	216
181	182	183	K	184	185	186	187	188	189	190	191	192	193	194	195		K	196	197	198
163	164	165	J	166	167	168	169	170	171	172	173	174	175	176	177		J	178	179	180
145	146	147	I	148	149	150	151	152	153	154	155	156	157	158	159		I	160	161	162
127	128	129	H	130	131	132	133	134	135	136	137	138	139	140	141		H	142	143	144
109	110	111	G	112	113	114	115	116	117	118	119	120	121	122	123		G	124	125	126
91	92	93	F	94	95	96	97	98	99	100	101	102	103	104	105		F	106	107	108
73	74	75	E	76	77	78	79	80	81	82	83	84	85	86	87		E	88	89	90
55	56	57	D	58	59	60	61	62	63	64	65	66	67	68	69		D	70	71	72
38	39	40	C	41	42	43	44	45	46	47	48	49	50	51			C	52	53	54
21	22	23	B	24	25	26	27	28	29	30	31	32	33	34			B	35	36	37
5	6	7	A	8	9	10	11	12	13	14	15	16	17				A	18	19	20
	1	2																3	4	

FRONT OF ROOM – 141 Wohlers Hall

1. (8 points each) Evaluate the following limits and write your answers in simplified form. For infinite limits, you must clearly show whether the limit is ∞ or $-\infty$. We will learn l'Hospital's Rule and other shortcuts for obtaining limits later. For now you are not allowed to use these approaches.

   (a) $\lim_{x \to 6^+} \dfrac{\cos(5\pi/x)}{\ln(7-x)}$

   (b) $\lim_{x \to -\infty} \dfrac{10\arctan(8x) + 19\pi}{18\arctan(4x) + 16\pi}$

(c) $\lim_{x \to \infty} \dfrac{6e^{2x} + 4}{5e^{x} - 2e^{2x}}$

2. (6 points) Simplify the following quantity.

$$3e^{5 \ln(2)} + \ln\left(9e^{10}\right) - \ln\left(9e^{2}\right)$$

3. (10 points) Suppose that $w(x)$ is odd, one-to-one, and its graph goes through the point $(-3, 1/8)$.

   (a) Determine another point which must be on the graph of $w(x)$.

   (b) Determine a point which must be on the graph of $w^{-1}(x)$.

4. (10 points) For a given acute angle θ, it is known that $\sec(\theta) = 5$. Evaluate the following quantities.

   (a) $\cos(2\theta)$

   (b) $\cos(\pi + \theta)$

5. (10 points) Let $f(x) = 8x^2 + 9x$.

   Use the definition of a derivative as a limit to prove that $f'(x) = 16x + 9$.

   Show each step in your calculation and be sure to use proper terminology in each step of your proof.

6. (10 points) The function $f(x) = 5e^{4x} - 50$ has derivative $f'(x) = 20e^{4x}$. Determine the equation for the line which is tangent to the graph of $f(x)$ at its x-intercept.

7. (10 points) The graphs of $f(x) = \ln(2) + 3\ln(-x)$ and $g(x) = \ln(-32x)$ intersect. Determine the x-value for each point of intersection. Simplify your answer.

8. (10 points) A bacterial culture starts with 400 bacteria and doubles in size every 2 hours.

   (a) Find a formula for the number of bacteria after t hours.

   (b) At what time is the population equal to 2400 ?

9. (10 points) Use interval notation to state the domain of the given function.

$$\frac{\ln(55-x)}{\sqrt{60-x}-\sqrt{x-24}}$$

Students – do not write on this page!

1a. (8 points) _____

1b. (8 points) _____

1c. (8 points) _____

2. (6 points) _____

3. (10 points) _____

4. (10 points) _____

5. (10 points) _____

6. (10 points) _____

7. (10 points) _____

8. (10 points) _____

9. (10 points) _____

TOTAL (100 points) _____