MATH 220 **Test 2** **Spring 2011**

Name _____

(circle your TA discussion section)

- ▷ **AD1**, TR 1:00-1:50, Sarah Son
- ▷ **AD2**, TR 1:00-1:50, Daniel Hockensmith
- ▷ **AD4**, TR 1:00-1:50, Sogol Jahanbekam
- ▷ **AD5**, TR 2:00-2:50, Daniel Hockensmith
- ▷ **AD7**, TR 3:00-3:50, Nersés Aramyan
- ▷ **AD8**, MW 11:00-12:50, Austin Rochford
- ▷ **AD9**, MW 9:00-10:50, Ben Reiniger

- Sit in your assigned seat (shown below).
- Do not open this test booklet until I say *START*.
- Turn off all electronic devices and put away all items except a pen/pencil and an eraser.
- You must show sufficient work to justify each answer.
- While the test is in progress, we will not answer questions concerning the test material.
- 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.

263	264	265	266	267	268	269	270	•	271	272	273					278	279	•	280	281	282	283	284	285	286	287
	240	241	242	243	244	245	246	•	247	248	249	250	251	252	253	254	255	•	256	257	258	259	260	261	262	
	217	218	219	220	221	222	223	•	224	225	226	227	228	229	230	231	232	•	233	234	235	236	237	238	239	
	194	195	196	197	198	199	200	•	201	202	203	204	205	206	207	208	209	•	210	211	212	213	214	215	216	
	171	172	173	174	175	176	177	•	178	179	180	181	182	183	184	185	186	•	187	188	189	190	191	192	193	
	148	149	150	151	152	153	154	•	155	156	157	158	159	160	161	162	163	•	164	165	166	167	168	169	170	
	•	•	•	•	•	•	•	•	139	140	141	56	143	144	13	146	147	•	•	•	•	•	•	•	•	
	116	117	118	119	120	121	122	•	123	124	125	126	127	132	145	130	131	•	16	133	134	135	136	137	138	
	93	94	95	96	97	98	99	•	100	101	102	103	128	105	106	107	108	•	109	110	111	112	113	114	115	
	70	71	72	73	74	75	76	•	77	78	79	80	81	82	83	84	85	•	86	87	88	89	90	91	92	
	47	48	49	50	51	52	53	•	54	55	104	57	58	59	60	61	62	•	63	64	65	66	67	68	69	
	24	25	26	27	28	29	30	•	31	32	33	34	35	36	37	38	39	•	40	41	42	43	44	45	46	
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FRONT OF ROOM – 314 Altgeld Hall

1. (9 points) Find $h'(t)$ given that $h(t) = 40t^3 + \dfrac{1}{3\sqrt{t}} - 18$

2. (9 points) Find $\dfrac{dq}{dt}$ given that $q = 5t^2 \sec t$

3. (9 points) Find $f'(x)$ given that $f(x) = \dfrac{x^5}{\ln x}$

4. (9 points) Find $w'(t)$ given that $w(t) = \tan^{-1}\left(5t^2\right)$

5. (9 points) Find $\dfrac{dy}{dx}$ given that $\sin\left(x^2 + y^3\right) = 5y + 8x$. It is okay to leave your answer in terms of both x and y.

6. (8 points) A poster is to contain 1000 $\texttt{cm}^2$ of printed matter with margins of 4 $\texttt{cm}$ each at top and bottom and 2 $\texttt{cm}$ at each side. Find the overall dimensions if the total area of the poster is a minimum.

7. (8 points) A particle is moving along the curve $y = \sqrt{1 + x^3}$. As it reaches the point $(2, 3)$, the y-coordinate is increasing at a rate of 18 `cm/sec`. How fast is the x-coordinate of the point changing at that instant?

8. (8 points) Upon which interval is the graph of $f(x) = 3x^4 - 20x^3 + 10$ increasing?

9. (8 points) A function $f(x)$ has the following second derivative.

$$f''(x) = 8e^x (x-6)^2 (2x-9) \left(x^2+25\right)$$

Find the x-value for each inflection point on the graph of $f(x)$.

10. (8 points) The graph of a function $y = f(x)$ has a y-intercept of 8 and has the property that the slope of the curve at every point P is twice the y-coordinate of P. What is the equation of the curve?

11. (5 points each) Evaluate the following limits.

(a) $\lim_{x \to 0} \dfrac{1 - x - e^{-x}}{x^2}$

(b) $\lim_{x \to \infty} \dfrac{\sqrt{x}}{\ln x}$

(c) $\lim_{x \to \infty} \left(1 - \dfrac{1}{2x}\right)^{3x}$

Students – do not write on this page!

1. (9 points) _____

2. (9 points) _____

3. (9 points) _____

4. (9 points) _____

5. (9 points) _____

6. (8 points) _____

7. (8 points) _____

8. (8 points) _____

9. (8 points) _____

10. (8 points) _____

11a. (5 points) _____

11b. (5 points) _____

11c. (5 points) _____

TOTAL (100 points) _____