MATH 220 **Test 1** **Fall 2011**

Name _____ **UIN** _____

(circle your TA discussion section)

- ▷ **BD1**, TR 11:00-12:50, Vicki Reuter
- ▷ **BD2**, TR 9:00-9:50, Tom Mahoney
- ▷ **BD3**, TR 10:00-10:50, Kyle Knee
- ▷ **BD4**, TR 2:00-2:50, Neha Gupta
- ▷ **BD5**, TR 12:00-12:50, Nate Orlow
- ▷ **BD6**, TR 9:00-10:50, Ser-Wei Fu
- ▷ **BD7**, TR 3:00-3:50, Chayapa Darayon
- ▷ **BD8**, TR 1:00-1:50, Eliana Duarte

- ▷ **DD1**, TR 11:00-11:50, Nate Orlow
- ▷ **DD2**, TR 10:00-10:50, Santiago Camacho
- ▷ **DD3**, TR 9:00-9:50, Sarah Loeb
- ▷ **DD4**, TR 12:00-12:50, Lisa Hickok
- ▷ **DD5**, TR 1:00-1:50, Lisa Hickok
- ▷ **DD6**, TR 1:00-2:50, Jennifer Wise
- ▷ **DD7**, TR 8:00-8:50, Sarah Loeb
- ▷ **DD8**, TR 1:00-1:50, Abdulla Eid

- ▷ **AD1**, TR 11:00-11:50, Abdulla Eid
- ▷ **AD2**, TR 2:00-2:50, Ilkyoo Choi
- ▷ **AD3**, TR 1:00-1:50, Ilkyoo Choi
- ▷ **AD4**, TR 9:00-9:50, Michael Santana
- ▷ **AD5**, TR 3:00-3:50, Santiago Camacho
- ▷ **AD6**, TR 4:00-4:50, Joe Nance
- ▷ **AD7**, TR 3:00-3:50, Neha Gupta

- 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	
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	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	
	1	2	3	4	5	6	7	•										•	17	18	19	20	21	22	23	

FRONT OF ROOM – 314 Altgeld Hall

1. (4 points each) Circle **true** if the given statement is always true. Otherwise circle **false**.

   (a) Given a function g, if $|g(x)| \leq x^4$ for all x then $\lim_{x \to 0} g(x) = 0$.

   true or **false** ?

   (b) If the point $\left(-4, \frac{1}{4}\right)$ is on the graph of an odd function g then $\left(-\frac{1}{4}, 4\right)$ is another point on the graph of g.

   true or **false** ?

   (c) Given a function g, if $\lim_{x \to 4} \dfrac{g(x) - g(4)}{x - 4}$ exists then g is continuous at 4.

   true or **false** ?

   (d) If a function g is continuous at 0 then $\lim_{x \to 0} g(x) = 0$.

   true or **false** ?

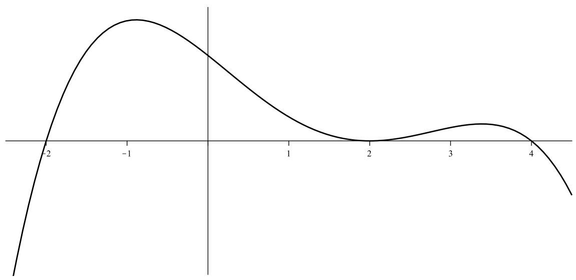
   (e) A function which is continuous at a point a must also be differentiable at a.

   true or **false** ?

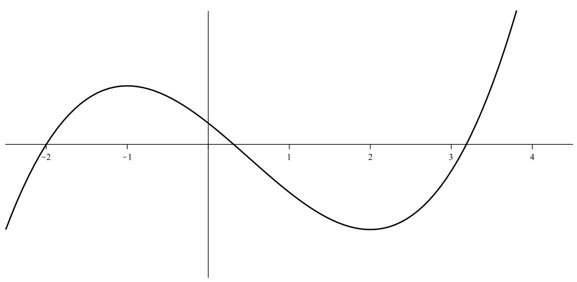
   (f) If a function g is one-to-one then $g(1) = 1$.

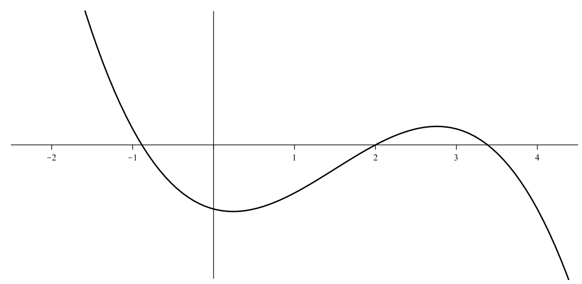
   true or **false** ?

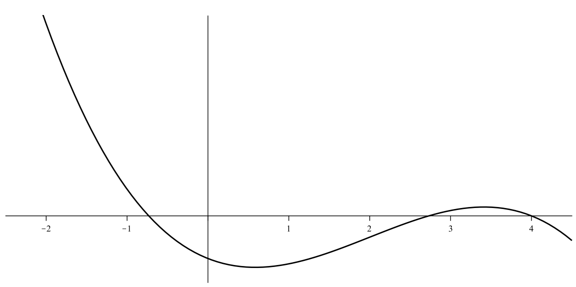
2. (6 points) Here is the graph of $y = f(x)$.

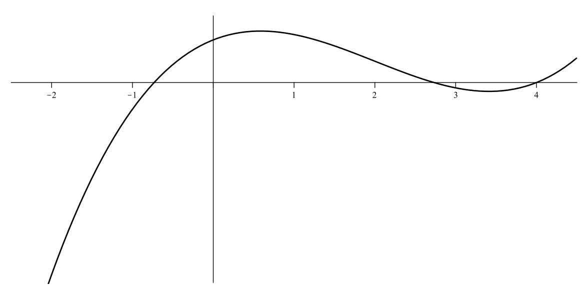


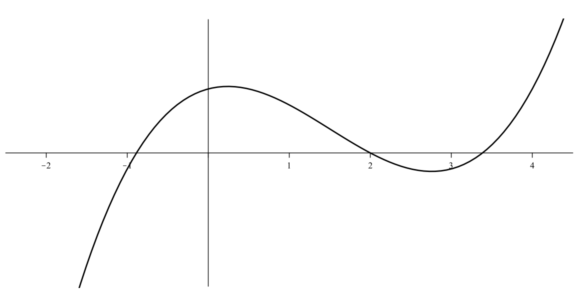
Circle the graph of $y = f'(x)$, given that it is one of the 6 choices below.

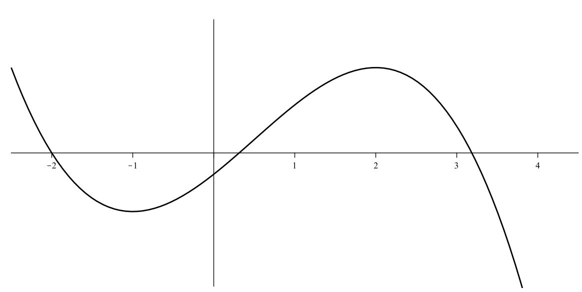












3. (12 points) Let $f(x) = 4x^3 + 2$. Use the definition of a derivative as a limit to prove that $f'(x) = 12x^2$ Show each step in your calculation and be sure to use proper terminology in each step of your proof.

4. (6 points) Suppose that f and g are one-to-one functions which take on the following values.

$$f(-2) = 2, \qquad f(-1) = 1/2, \qquad f(0) = -1/2, \qquad f(1) = -2, \qquad f(2) = -4$$
$$g(-2) = -4, \qquad g(-1) = -2, \qquad g(0) = -1/2, \qquad g(1) = 1/2, \qquad g(2) = 2$$

What is the value of $f^{-1}\left(g^{-1}(-4)\right)$?

5. (4 points each) State the domain of each function.

(a) $f(x) = \cos^{-1} x$

(b) $g(x) = \dfrac{8 - x}{\ln(x - 4)}$

(c) $h(x) = \sqrt{x^2 + 9}$

6. (10 points) Solve for x in the equation below.

$$\ln(x-4) + \ln(x-1) = 2\ln(5-x)$$

7. (6 points each) Evaluate the following limits. Show sufficient justification for each answer. An answer of 'does not exist' is not sufficient. For infinite limits you must state if it is ∞ or $-\infty$.

   (a) $\lim_{x\to\infty} \dfrac{(3x+1)^2}{2x^2+5}$

   (b) $\lim_{x\to 0} \dfrac{5x^2+2x+3}{7x^2+4}$

(c) $\lim_{x \to 1} \dfrac{\sqrt{9x} - 3}{x - 1}$

(d) $\lim_{x \to 0} \left(\dfrac{1 - (\cos x + \sin x)^2}{10x \cos x} \right)$

(e) $\lim_{x \to 4^-} \dfrac{\ln(x/8)}{\ln(x/4)}$

Students – do not write on this page!

1. (24 points) _____

2. (6 points) _____

3. (12 points) _____

4. (6 points) _____

5. (12 points) _____

6. (10 points) _____

7a. (6 points) _____

7b. (6 points) _____

7c. (6 points) _____

7d. (6 points) _____

7e. (6 points) _____

TOTAL (100 points) _____