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
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	171	172	173	174	175	176	177	•	178	179	180	181	182	183	184	185	186	•	187	188	189	190	191	192	193
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	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. (8 points) Determine an appropriate linear approximation of the function $f(x) = \sqrt{x}$ and use it to approximate $\sqrt{26.3}$. Write your answer in decimal form.

2. (6 points) Precisely state *Rolle's Theorem*.

3. (8 points) Evaluate the following limit. Be sure to use proper notation throughout your evaluation of this limit. Simplify your answer.

$$\lim_{n\to\infty} \sum_{k=1}^{n} \left(\frac{17}{4n} - \frac{5k}{2n^2} \right)$$

4. (12 points) Suppose f is an even function, g is an odd function, and f and g are each integrable on the interval $[-3, 3]$. Given that $\int_0^3 f(x)\, dx = 5$ and $\int_0^3 g(x)\, dx = 4$, evaluate the following definite integrals.

(a) $\int_3^0 g(x)\, dx$

(b) $\int_3^3 f(x)\, dx$

(c) $\int_{-3}^3 (2f(x) + 4g(x))\, dx$

(d) $\int_{-3}^3 \left(4 + (g(x))^5 \right) dx$

5. (9 points each) Evaluate the following definite integrals. Simplify each answer.

(a) $\int_{\pi/3}^{\pi/2} (12 + 6\sin x)\ dx$

(b) $\int_{0}^{2} \left(6x^2 + 3e^{-x}\right)\ dx$

6. (8 points each) Evaluate the following indefinite integrals.

(a) $\int \dfrac{6x^3 + 4x^2 + 5x}{x^2} \, dx$

(b) $\int \dfrac{1}{x\sqrt{\ln x}} \, dx$

(c) $\displaystyle\int \tan^5 x \sec^4 x \, dx$

7. (6 points) Evaluate the following indefinite integral.

$$\int x^2 \sqrt{x+1} \, dx$$

8. (6 points each) The intersection points on the graphs of $f(x) = x^2 + 2$ and $g(x) = 3x + 6$ occur at $x = -1$ and at $x = 4$. Let **R** be the finite region bounded by the graphs of $f(x)$ and $g(x)$. Set up, but do not evaluate, definite integrals which represent the given quantities. Use proper notation.

(a) The area of **R**.

(b) The volume of the solid obtained when **R** is revolved around the vertical line $x = 10$.

(c) The volume of the solid obtained when **R** is revolved around the x-axis.

Students – do not write on this page!

1. (8 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

2. (6 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

3. (8 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

4. (12 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

5a. (9 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

5b. (9 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

6a. (8 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

6b. (8 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

6c. (8 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

7. (6 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

8a. (6 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

8b. (6 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

8c. (6 points) ⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯⎯

TOTAL (100 points) ⎯⎯⎯⎯⎯⎯⎯