**MATH 220** **Test 3** **Fall 2010**

**Name** _____

(circle your TA discussion section)

- ▷ **BD1**, MW 11:00-12:50, Noel DeJarnette
- ▷ **BD2**, TR 9:00-9:50, Kyle Knee
- ▷ **BD3**, TR 10:00-10:50, Scott Tichenor
- ▷ **BD4**, TR 2:00-2:50, Dan Schultz
- ▷ **BD5**, TR 11:00-11:50, Scott Tichenor
- ▷ **BD7**, MW 1:00-2:50, Scott Wetter
- ▷ **BD8**, TR 12:00-12:50, Hong Liu
- ▷ **BD9**, TR 1:00-1:50, Dan Schultz
- ▷ **DD1**, TR 11:00-11:50, Sarah Son
- ▷ **DD2**, TR 10:00-10:50, Sarah Son
- ▷ **DD4**, TR 12:00-12:50, Donghoon Jang
- ▷ **DD5**, TR 1:00-1:50, Donghoon Jang
- ▷ **DD6**, MW 1:00-2:50, Jesse Beder
- ▷ **DD7**, TR 8:00-8:50, Mu-Tsun Tsai
- ▷ **DD8**, MW 9:00-10:50, Joseph Vandehey
- ▷ **DD9**, TR 9:00-9:50, Mu-Tsun Tsai
- ▷ **AD1**, TR 11:00-11:50, Stephen Longfield
- ▷ **AD2**, TR 2:00-2:50, Lisa Hickok
- ▷ **AD3**, TR 1:00-1:50, Stephen Longfield
- ▷ **AD6**, TR 9:00-9:50, Lisa Hickok
- ▷ **AD7**, TR 3:00-3:50, Sarah Yeakel
- ▷ **AD8**, TR 4:00-4:50, Daniel Hockensmith

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- 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.

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

FRONT OF ROOM – 314 Altgeld Hall

1. (6 points) The function $f(x) = 10x^3 - 20x + 1$ has one root in the interval $[1, 2]$. In order to approximate this root, begin with an initial estimate of $x_1 = 2$ and use Newton's Method to obtain a second estimate $x_2$. Write the value of $x_2$ in decimal form.

2. (4 points) Precisely state *The Mean Value Theorem.*

3. (6 points) A function $f(x)$ has derivative $f'(x) = 6x^2 + 5$. Find a formula for $f(x)$ given that its graph goes through the point $(1, 15)$.

4. (6 points) Evaluate the following limit. Be sure to use proper notation throughout your evaluation of this limit.

$$\lim_{n\to\infty} \sum_{k=1}^{n} \left( \frac{14k}{n^2} - \frac{4}{n} \right)$$

5. (6 points) The height of a tree is currently 100 inches. It is predicted that over the next 4 years the tree's height will increase by $10 - 3\sqrt{t}$ inches per year where $t$ represents the number of years from now. What will the tree's height be 4 years from now? Simplify your answer.

6. (6 points each) Evaluate the following definite and indefinite integrals.

(a) $\int \left( \frac{8}{x} + 4\csc^2 x + 3 \right) \, dx$

(b) $\int_{\pi/2}^{\pi} (10 + 3\cos x) \, dx$

(c) $\int_0^2 (6x + 2e^{-x}) \, dx$

(d) $\int x^3 \left(x^4 + 7\right)^5 \, dx$

(e) $\int \sin^3 x \cos^5 x \, dx$

(f) $\int \left(5 - 3\tan^2 x\right)\, dx$

7. (4 points each) Suppose that $f$ is integrable on the interval $[2, 12]$. Given that $\int_2^{12} f(x)\, dx = 25$, $\int_2^8 f(x)\, dx = 10$ and $\int_4^{12} f(x)\, dx = 22$, evaluate the following definite integrals.

   (a) $\int_8^2 f(x)\, dx$

   (b) $\int_2^4 f(x)\, dx$

   (c) $\int_4^8 f(x)\, dx$

8. (6 points each) Let $\mathbf{R}$ be the region bounded above by graph of $y = \dfrac{\sin x}{x}$ and bounded below by the $x$-axis on the interval $[2\pi, 3\pi]$. Set up, but do not evaluate, definite integrals which represent the given quantities. Use proper notation.

   (a) The area of $\mathbf{R}$.

   (b) The volume of the solid obtained when $\mathbf{R}$ is revolved around the $x$-axis.

   (c) The volume of the solid obtained when $\mathbf{R}$ is revolved around the vertical line $x = 3$.

9. (6 points) Suppose $F(x)$ is a polynomial with $F'(x) = f(x)$. Given that $F(0) = 2$, $F(2) = 8$, $F(4) = 28$, $F(6) = 68$ and $F(8) = 42$, find the average value of $f(x)$ on the interval $[2, 6]$.

**Students – do not write on this page!**

1 (6 points) _____

2 (4 points) _____

3 (6 points) _____

4 (6 points) _____

5 (6 points) _____

6a (6 points) _____

6b (6 points) _____

6c (6 points) _____

6d (6 points) _____

6e (6 points) _____

6f (6 points) _____

7 (12 points) _____

8a (6 points) _____

8b (6 points) _____

8c (6 points) _____

9 (6 points) _____

**TOTAL (100 points)** _____