**MATH 220** **Test 2** **Spring 2012**

**Name** _____ **UIN** _____

(circle your TA discussion section)

- ▷ **AD1**, TR 11:00-11:50, Amita Malik
- ▷ **AD2**, TR 1:00-1:50, Amita Malik
- ▷ **AD3**, TR 1:00-1:50, Neha Gupta
- ▷ **AD4**, TR 1:00-1:50, Meghan Galiardi
- ▷ **AD5**, TR 2:00-2:50, Neha Gupta
- ▷ **AD7**, TR 3:00-3:50, Meghan Galiardi
- ▷ **AD8**, TR 1:00-2:50, Hannah Kolb-Spinoza
- ▷ **AD9**, TR 9:00-10:50, Vicki Reuter

- ▷ **BD1**, TR 2:00-2:50, Stephen Longfield
- ▷ **BD2**, TR 8:00-8:50, Eliana Duarte
- ▷ **BD3**, TR 11:00-11:50, Michael Santana
- ▷ **BD4**, TR 9:00-9:50, Eliana Duarte
- ▷ **BD5**, TR 2:00-2:50, Stephen Berning
- ▷ **BD6**, TR 1:00-1:50, Faruk Temur
- ▷ **BD7**, TR 3:00-3:50, Stephen Berning
- ▷ **BD8**, TR 3:00-3:50, Stephen Longfield

---

- Sit in your assigned seat (circled below).
- Circle your TA discussion section.
- 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.
- Remove hats and sunglasses.
- You must show sufficient work to justify each 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.

---

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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. (2 points each) Circle **true** if the given statement is always true. Otherwise circle **false**.

   (a) Given a polynomial $f(x)$, if $f'(x)$ is increasing on an open interval then $f$ is concave up on that interval.

   **true** or **false** ?

   (b) If $f''(a) = 0$ then there is an inflection point at $x = a$.

   **true** or **false** ?

   (c) $\lim_{x \to a} \dfrac{f(x)}{g(x)} = \lim_{x \to a} \dfrac{f'(x)}{g'(x)}$

   **true** or **false** ?

   (d) The solution to the differential equation $\dfrac{dq}{dr} = 2q$ is an exponential function.

   **true** or **false** ?

2. (8 points) Find $h'(x)$ given that $h(x) = 5x^4 - \sqrt[3]{x} + \sec x + \ln x$

3. (8 points) Find $\dfrac{dw}{dt}$ given that $w = 10t^5 \sin^{-1} t$

4. (8 points) Find $f'(x)$ given that $f(x) = \dfrac{x^3}{x^5 + 4x + 2}$

5. (8 points) Find $g'(t)$ given that $g(t) = \cos\left(\tan\left(t^8\right)\right)$

6. (12 points) A man is standing on a bridge over a river. He reaches over the railing and throws a stone vertically upward. Until it lands in the river, the stone's height in feet above the river is $h = -16t^2 + 24t + 40$ where $t$ is measured in seconds since the stone was thrown. What is the velocity of the stone as it strikes the river? Simplify your answer.

7. (9 points) What is the slope of line tangent to the graph of $f(x) = \dfrac{\sin(2x)\cos x}{1-\sin^2 x}$ at $x = \pi/3$ ? Simplify your answer.

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

9. (8 points) Evaluate the following limit.

$$\lim_{x \to 0} \frac{e^{3x} - 3x - 1}{5x^2}$$

10. (12 points) For the given function determine the intervals upon which it is increasing/decreasing, as well as the $x$-coordinate for each local maxima/minima.

$$f(x) = \frac{x - 1}{x^2 + 24}$$

11. (10 points) For each $x > 0$, a triangle is formed with vertices $(0, 0)$, $\left(x, 3e^{-2x}\right)$ and $\left(x, -5e^{-2x}\right)$. What is the value of $x$ which results in the triangle of largest area?

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

1. (8 points) _____
2. (8 points) _____
3. (8 points) _____
4. (8 points) _____
5. (8 points) _____
6. (12 points) _____
7. (9 points) _____
8. (9 points) _____
9. (8 points) _____
10. (12 points) _____
11. (10 points) _____

**TOTAL (100 points)** _____