Math 21 – Review for exam 2: sections 151 – 162

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| 1 | Find the domain of $f(x,y)$:<br>A) $f(x,y) = \frac{1}{\sqrt{1-x^2-y^2}}$ B) $f(x,y) = \ln(xy)$ |
| 2 | Describe the level curves of<br>A) $z = x^2 + y^2 + 5$ for $z = 5, z = 30$<br>B) $z = 6 - 2x - 3y$ for $z = 0,6$ |
| 3 | Find $f_x, f_y, f_{xx}, f_{yy}, and\ f_{xy}$ :<br>A) $f(x,y) = x^2 + y^2 - 2x^2y + 10x + 10y$<br>B) $f(x,y) = e^{-(x^2+y^2)}$ |
| 4 | Find the equation of the tangent plane to $f(x,y) = 6x^2 - 2x + 3y$ at $(1,-1)$. |
| 5 | For $f(x,y) = xcos\ y - ycosx$ find the differential. |
| 6 | For $f(x,y) = x^2y^2 - 3xy + 10x$ A) evaluate $\Delta z = f(1.05,2.1) - f(1,2)$<br>B) find the differential at $(x,y) = (1,2)$ and $dx = .05\ and\ dy = .1$ . |
| 7 | Find $\frac{dz}{dt}$: A) $z = \sqrt{x^2 + y^2}$ , $x = \sin t, y = e^t$<br>B) $z = xycosx$ , $x = t, y = t^2$ |
| 8 | A cone is increasing in size. The radius is given by $r = 3t\ inches$ where $t$ is in seconds and the height is $h = t^2$ . Find the rate of change of the volume when $t = 3$. ( $V = \frac{1}{3}\pi r^2 h$) |
| 9 | For $z = x^2 - y^2$ , $x = s\cos t$ and $y = s\sin t$ find A) $\frac{\partial z}{\partial s}$ B) $\frac{\partial z}{\partial t}$ |
| 10 | Find the extreme (max/min) and saddle points for:<br>A) $f(x,y) = \sqrt{x^2 + y^2 + 1}$<br>B) $f(x,y) - x^2 - y^2 + 4x + 8y - 11$<br>C) $f(x,y) = -5x^2 + 4xy - y^2 + 16x + 10$<br>D) $f(x,y) = x^3 - 3xy + y^3$ |
| 11 | Set up the double integral that gives the area in the xy-plane bounded by<br>$y = \sqrt{x}\ y = -x + 1\ and\ the\ x - axis.$ Evaluate the integral. |
| 12 | Evaluate the integral<br>A) $\int_0^3 \int_0^2 4 - y^2\, dy\, dx$<br>B) $\int_{-1}^0 \int_{-1}^1 x + y + 1\, dxdy$<br>C) $\int_0^\pi \int_0^x x \sin y\ dydx$ |

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| 13 | Integrate $f(x,y) = \frac{x}{y}$ over the region in the first quadrant bounded by $y = x, y = 2x, x = 1, x = 2$. |
| 14 | Integrate $f(x,y) = x^2 + y^2$ over the triangular region with verticies $(0,0), (1,0), and\ (0,1)$. |
| 15 | Find the volume of the region below the paraboloid $z = x^2 + y^2$ and above the region bounded by the lines $y = x, x = 0\ and\ x + y = 2$ in the xy-plane. |
| 16 | Find the volume of the solid under the plane $z = 2x$ and above the triangle with verticies $(0,0), (2,2), and\ (2,0)$. |