

Name \_\_\_\_\_ Date \_\_\_\_\_

Instructions: Please show all of your work as partial credit will be given where appropriate, **and** there may be no credit given for problems where there is no work shown. All answers should be completely simplified, unless otherwise stated.

1. Convert  $(-2, \frac{\pi}{4}, 2)$  from cylindrical to spherical coordinates.

Answer: \_\_\_\_\_

2. Convert  $r^2 \cos(2\theta) = z$  to Cartesian coordinates.

Answer: \_\_\_\_\_

3. (5 points each) Let  $f(x, y) = \frac{3x^2y - 2\sqrt{y-1}}{xy}$  .

(a) Find  $f(2, 1) =$  \_\_\_\_\_

(b) Find  $f\left(\frac{1}{t}, t^2\right) =$  \_\_\_\_\_

(c) What is the domain? Domain: \_\_\_\_\_

(d) Find  $f_x(2, 1) =$  \_\_\_\_\_