

Quiz 3

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$$6. \vec{r}(t) = t \hat{i} + t^2 \hat{j} + t^3 \hat{k}$$

$$r'(t) = \hat{i} + 2t \hat{j} + 3t^2 \hat{k}$$

$$\|r'(t)\| = \sqrt{1 + 4t^2 + 9t^4}$$

$$S = \int_0^2 \sqrt{1 + 4t^2 + 9t^4} dt \approx 9.57 \dots$$

$$b. r''(t) = 2 \hat{j} + 6t \hat{k}$$

$$r' \times r'' = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & 2t & 3t^2 \\ 0 & 2 & 6t \end{vmatrix} =$$

$$= (12t^2 - 6t^2) \hat{i} - (6t - 0) \hat{j} + (2 - 0) \hat{k}$$

$$= 6t^2 \hat{i} - 6t \hat{j} + 2 \hat{k}$$

$$\frac{\|r' \times r''\|}{\|r'(t)\|^{3/2}} = \frac{\sqrt{36t^4 + 36t^2 + 4}}{(1 + 4t^2 + 9t^4)^{3/2}} = K$$

$$K(2) = \frac{\sqrt{\del{161} 724}}{(161)^{3/2}} \approx .01317 \dots$$

$t=2$ at
(2, 4, 8)

$$c) R = \frac{(161)^{3/2}}{\del{161} 724} \approx 75.922 \dots$$

$$2. f(x, y) = \frac{x}{x^2 + y^2}$$

$$z = \frac{x}{x^2 + y^2}$$

$$\frac{x}{z} = x^2 + y^2$$

$$\sqrt{y^2} = \sqrt{\frac{x}{z} - x^2}$$

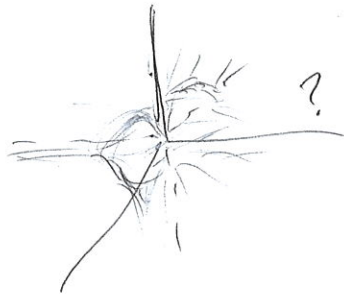
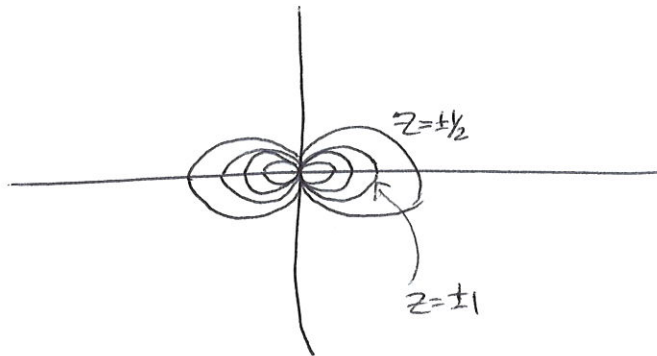
$$y = \pm \sqrt{\frac{x}{z} - x^2}$$

$$y = \pm \sqrt{\pm 4 - x^2}$$

$$y = \pm \sqrt{\pm x - x^2}$$

$$y = \pm \sqrt{\pm \frac{2}{3}x - x^2}$$

$$y = \pm \sqrt{\pm \frac{1}{2}x - x^2}$$



z increases along
 x -axis
 but goes to zero
 along y