

Math 0220 Sample Final 1

(10 pts.)

- 1a. A particle moves with speed 2 around a circle of radius 4 centered at $(x, y) = (1, 0)$. Assume that the particle is at $(x, y) = (5, 0)$ at time $t = 0$. Find the vector equation describing the motion of the particle if it moves clockwise around the circle as t increases.

(15 pts.)

- 1b. The trajectory of an object is described by the vector function

$$\vec{r} = (4 + 7t^3)\vec{i} + (1 - 2t)\vec{j}, \quad -\infty < t < \infty$$

Eliminate t and find an equation in x and y that describes the curve on which the object moves.

(15 pts.)

2. Use a tangent line to the function $f(x) = (8x)^{1/3}$ to find an approximate value for $(8.08)^{1/3}$.

(10 pts.)

3. Using Newton's method, find x_2 , the second iterate, to approximate the solution of $x^5 + x^3 = 1$. Assume that $x_1 = 1$.

4. Given the function:

$$f(x) = \begin{cases} \frac{1}{x^2}, & -\infty < x \leq -1 \\ -\frac{x}{2}, & -1 < x \leq 0 \\ 1 + x^2, & x > 0 \end{cases}$$

Determine:

(5 pts. each)

4a. $\lim_{x \rightarrow -1^+} f(x)$

4b. $\lim_{x \rightarrow 0^-} f'(x)$

4c. Sketch the graph of the function.