

MA 123 - Exam 2 - Sample Questions from a Previous Exam - Prof. Meuser

1) Find $f'(x)$ if

$$a) f(x) = (\sin \pi x + \cos \pi x)^5 \quad b) f(x) = \frac{x + 3}{(x^2 - 6x + 2)^2}$$

2) A woman who is 5 ft. tall walks away from a 20 ft. lamppost at the rate of 6 ft. / min. How fast is the length of her shadow increasing?

3) Use the linear approximation formula

$$f(a + \Delta x) \approx f(a) + f'(a)\Delta x$$

with $f(x) = x^{10}$ and $a = 1$ to give an approximate value for $(0.98)^{10}$.

4) Find dy/dx by implicit differentiation when

$$x = y(y - 1)$$

5) Find the absolute maximum and minimum values of

$$f(x) = \sin x \cos x \quad \text{for } -\pi/2 \leq x \leq \pi/2$$

6) Let

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

- Find the intervals where $f(x)$ is increasing and the intervals where $f(x)$ is decreasing. Determine any relative maximum and minimum points.
- Find the intervals where $f(x)$ is concave up and the intervals where $f(x)$ is concave down. Determine any inflection points.
- Find any horizontal asymptotes and any vertical asymptotes for $f(x)$
- Sketch a graph of $f(x)$ that clearly reflects all the information you obtained in a), b) and c).