

Honors Math 182 Quiz 8 Version A

Feel free to use the computers, your calculator, notes and textbooks while working on this quiz. You may also use online resources such as Wikipedia, Google and Wolfram Alpha; however, do not use email or any other messaging service during the quiz.

1. Let  $f$  be an  $n + 1$  times continuously differentiable function. Taylor's formula says

$$f(x) = \sum_{k=0}^n \frac{(x-a)^k}{k!} f^{(k)}(a) + \int_a^x \frac{(x-t)^n}{n!} f^{(n+1)}(t) dt.$$

The sum in the above formula is denoted  $P_n(x)$  and called Taylor's polynomial.

- (i) Find  $P_5(x)$  corresponding to  $f(x) = \sqrt{x+1}$  when  $a = 0$ .

- (ii) Compute  $P_5(1/2)$  and write your answer as a fraction.

- (iii) Find the remainder  $f(1/2) - P_5(1/2)$  and write your answer as a decimal.

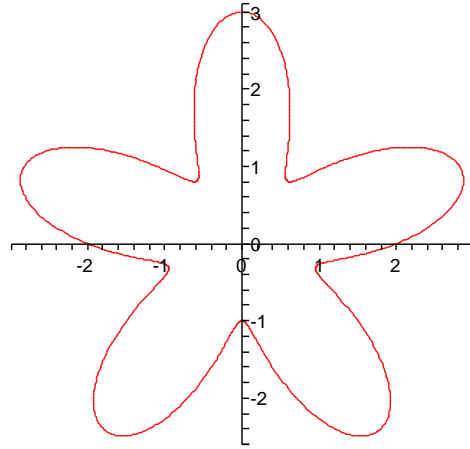
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2. Consider the curve  $(f(t), g(t))$  given by

$$f(t) = (\cos t)(2 + \sin 5t) \quad \text{and} \quad g(t) = (\sin t)(2 + \sin 5t)$$

where  $0 \leq t \leq 2\pi$ .

(i) Find the length of this curve.



(ii) Find the slope of the line tangent to this curve at the point  $(2, 0)$ .

(iii) Find the radius of the circle osculating with this curve at the point  $(2, 0)$ .