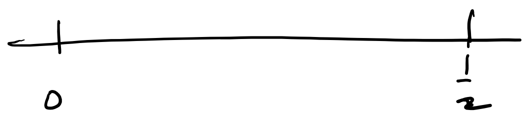
center = 0

Use the first 3 terms of the Taylor polynomial for $g(x) = \ln(1+x)$

The polynomial is used to approximate $g(0.5)$. Max error?

Taylor Error Bound: $\dfrac{f^{(n+1)}(u) \cdot (x-a)^{n+1}}{(n+1)!}$



choose u to maximize $f^{(n+1)}(u)$

$g(0) = \ln(1+0) = 0$

$g'(x) = \dfrac{1}{1+x} \quad g'(0) = 1$

$g''(x) = -(1+x)^{-2} = -\dfrac{1}{(1+x)^2} \quad g''(0) = -1$

$T_2(x) = 0 + \dfrac{x}{1!} - \dfrac{x^2}{2!}$ $\underline{\underline{f.4}}$

Error Bound: $g'''(x) = 2(1+x)^{-3} = \dfrac{2}{(1+x)^3}$

choose u to maximize $g'''(x)$ on $(0, 1/2) \longrightarrow 2$

$\dfrac{2x^3}{3!} \qquad \dfrac{2\left(\frac{1}{2}\right)^3}{3!} = \dfrac{2\left(\frac{1}{8}\right)}{6} = \dfrac{1}{24}$

error $< \frac{1}{24}$

10.4

$$\sum_{n=1}^{\infty} (-1)^{n+1} \cdot \frac{1}{n^3}$$

How many terms needed so that error $< 10^{-4}$?

$$\frac{1}{n^3} < 10^{-4}$$

$$n^3 > 10^4$$

$$n > \sqrt[3]{10^4} = 21.5$$

$$21^3 < 10^4$$

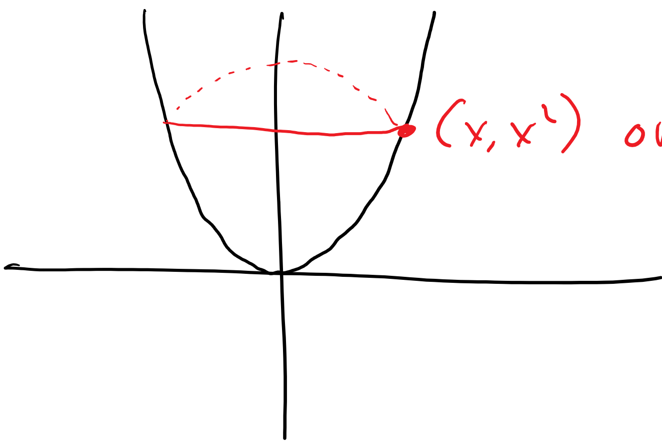
$$22^3 > 10^4$$

use 21 terms

Tuesday, June 11, 2019 9:57 AM

6.2 Volume

The base of a solid is bounded by $y = x^2$ and $y = 9$. The cross-sections $\perp$ to y-axis are semicircles. Find its volume.



(x, x^2) OR $(\sqrt{y}, y)$

radius $= \sqrt{y}$

area $= \frac{\pi}{2} y$

volume $= \frac{\pi}{2} \int_0^9 y \, dy$

$\frac{\pi}{2} \cdot \frac{y^2}{2} \Big|_0^9 = \frac{81\pi}{4}$