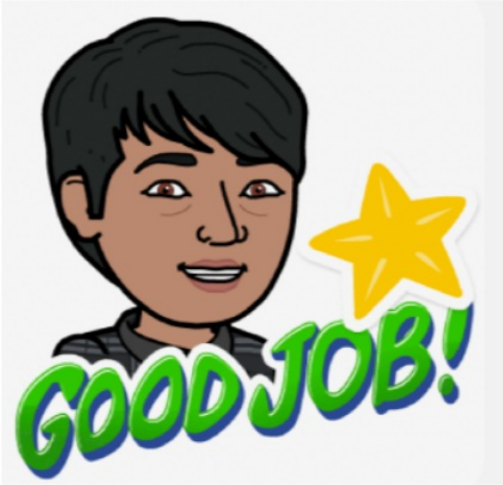
Practice Assessment! Real assessment is Friday

10 skills! Huge opportunity to raise your grade



Good afternoon: warm up (no calculator)

$(2, 4)$

Let f be a differentiable function such that $f(2) = 4$ and $f'(2) = -\frac{1}{2}$. What is the approximation for $f(2.1)$ found by using the line tangent to the graph of f at $x = 2$?

(A) 2.95 (B) 3.95 (C) 4.05 (D) 4.1

$y - 4 = -\frac{1}{2}(\cancel{x}\,2.1 - 2) \rightarrow y - 4 = -\frac{1}{20}$

$-\frac{1}{2}(\cancel{0.1}\,\frac{1}{10}) = -\frac{1}{20}$

$y = 4 - \frac{1}{20} \rightarrow \underline{3.95}$

Net Change Theorem

$$\int_a^b f'(x)\,dx = f(b) - \cancel{f(a)} \quad \text{(FTC \#2)}$$

$+f(a)$ $\qquad$ $\cancel{+f(a)}$

$$f(a) + \int_a^b f'(x)\,dx = f(b)$$

$$\Updownarrow$$

Net change theorem

$$f(b) = f(a) + \int_a^b f'(x)\,dx.$$

Net change!

A honey bee population starts with 30 bees and grows at a rate of b'(t)=ln(12t+1) bees per day. How many bees are there after 1 day?

After 3 days?

$$b(1) = b(0) + \int_0^1 \boxed{b'(t)}\,dt$$

$\ln(12t+1)$

$$30 + 1.779$$

31 bees

$$b(3) = b(0) + \int_0^3 b'(t)\,dt$$

$$30 + 8.134$$

$\approx$ 38 bees

For $0 \le t \le 31$, the rate of change of the number of mosquitoes on Tropical Island at time t days is modeled by $M(t) = 5\sqrt{t}\cos\left(\frac{t}{5}\right)$ mosquitoes per day. There are 1000 mosquitoes on Tropical Island at time $t = 0$.

a) Show that the number of mosquitoes on Tropical Island is increasing at time $t = 6$.

b) Set up an integral to determine the net change in the mosquito population on the island for $0 \le t \le 31$. Round your answer to the nearest whole number.

c) How many mosquitoes will be on the island at time $t = 31$?

a.) $M(6) \approx 4.438 > 0$

b.) $\int_0^{31} 5\sqrt{t}\cos\left(\frac{1}{5}t\right)dt \approx -35.665 = -35$ mos.

$1000 + \int_0^{31} M(t)\,dt$

964

The rate at which water flows out of a pipe, in gallons per hour, is given by a differentiable function R of time t. The table to the right shows the rate as measured every 3 hours for a 24-hour period.

a) Use a midpoint Riemann sum with 4 subdivisions of equal length to approximate $\int_0^{24} R(t)\,dt$. Using correct units, explain the meaning of your answer in terms of water flow.

$n=4$

$\Delta x = \frac{24-0}{4} = 6$

b) The water flows out of the pipe and into a water tank that originally contained 115 gallons of water. If the total capacity of the tank is 350 gallons, will the tank be able to store all the water over the 24-hour period?

t (hours)	$R(t)$ (gallons per hour)
0	9.6
3	10.4
6	10.8
9	11.2
12	11.4
15	11.3
18	10.7
21	10.2
24	9.6

6 6 6 6

a) $\int_0^{24} R(t)\,dt = 6[10.4 + 11.2 + 11.3 + 10.2] = 258.6$ gal.

b) $115 + 258.6 = 373.6 > 350$!!

Work on the practice assessment for the remainder of class
Solutions will be posted...tonight after tutoring