Bret R. McMahon

Chapter 2 - POSSIBLE TEST PROBLEM

SECTION 2.5 problem 27

A growing box has length t, width $1/(1+t)$, and height $\cos t$.

A) what is the rate of change of the volume?

B) what is the rate of change of the surface area?

ANSWER:

A) $V = l \cdot w \cdot h$

$V' = lwh' + lw'h + l'wh$

$= (t)\left(\frac{1}{1+t}\right)(-\sin t) + (t)\left(\frac{-1}{(1+t)^2}\right)(\cos t) + (1)\left(\frac{1}{1+t}\right)(\cos$

$= -\frac{t(\sin t)}{1+t} - \frac{t(\cos t)}{(1+t)^2} + \frac{\cos t}{(1+t)}$

$= \frac{-t(\sin t) + \cos t}{(1+t)} - \frac{t \cos t}{(1+t)^2}$

$= \frac{(-t\sin(t) + \cos(t))(1+t) - t\cos(t)}{(1+t)^2}$

$= \frac{-t\sin t - t^2\sin t + \cos t + \cancel{t\cos t} - \cancel{t\cos t}}{(1+t)^2}$

$\boxed{= \frac{-t\sin t - t^2\sin t + \cos t}{(1+t)^2}}$

Evan
Robie

Chapter 2 problem

2.4 #19

Where does $y = \sin x + \cos x$ have zero slope?

$y = \sin x + \cos x \qquad y' = \cos x - \sin x = 0$

$\boxed{\text{when } x = \frac{\pi}{4}}$

$f'(\frac{\pi}{4}) = \cos(\frac{\pi}{4}) - \sin(\frac{\pi}{4})$
$= \frac{\sqrt{2}}{2} - \frac{\sqrt{2}}{2} = \boxed{0}$

This problem embodies the idea that the slope is the derivative of the function and when the derivative = 0, the slope is zero. Also this problem is good practice of the derivative of sine & cosine.

Lauren Castener

chapter 2 review

Q: The gold you own will be worth $\sqrt{t}$ million dollars in t years. When does the rate of increase drop to 10% of the current value, so you should sell the gold + buy a bond? At $t = 25$, how far does that put you ahead of $\sqrt{t} = 5$?

A: $f(x) = \sqrt{t}$ 10% ↓
$f'(x) = 1/2\sqrt{t}$ $= \sqrt{t}/10$
So $2t = 10$ or $t = 5$
$y - \sqrt{5} = \sqrt{5}/10\,(t-5) \rightarrow y - \sqrt{5} = 2\sqrt{5}$ at $t = 25$
$y = 3\sqrt{5} = 6.7$ million dollars
The gold is worth only 5 million

Why: I think this question shows how usefull a derviate can be for these type of equations. It also shows that you have to leave the curve of an equation + go to the tangent line so you can finish + find the answer. It combines two equations to find the answer needed.

Mitch
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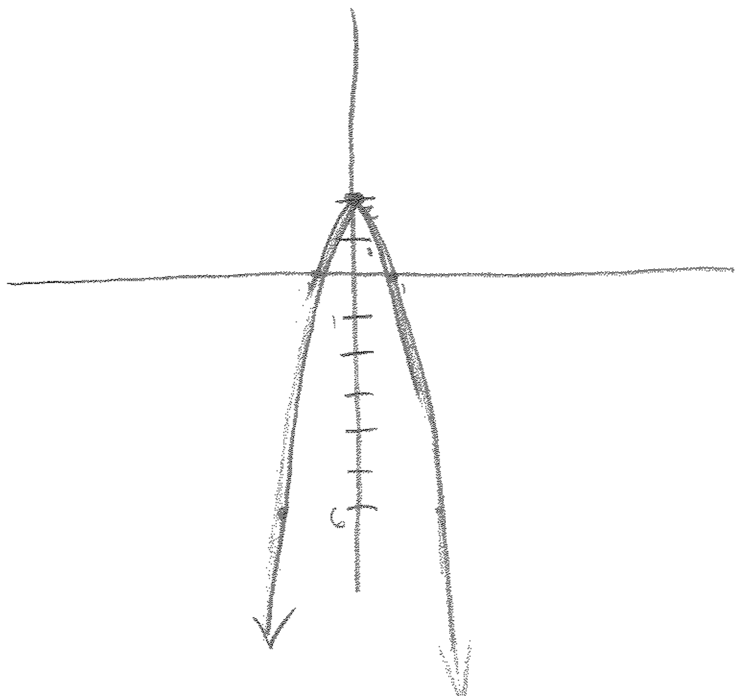
Chapter 2 Review problem

Sketch the Curve $y(x) = -2x^2+2$

And Compute its Slope At $x=2$



$$\frac{\Delta f}{\Delta x} = \frac{f(x+\Delta x) - f(x)}{\Delta x}$$

$$= \frac{-2(x+\Delta x)^2+2-(-2x^2+2)}{\Delta x} = \frac{-2(x^2+2x\Delta x+\Delta x^2)+2+2x^2-2}{\Delta x}$$

$$= \frac{\cancel{-2x^2}-4x\Delta x-2\Delta x^2\cancel{+2}\cancel{+2x^2}\cancel{-2}}{\Delta x} = \frac{-4x\cancel{\Delta x}-2\Delta x^2}{\cancel{\Delta x}}$$

$$\boxed{= -4x - 2\Delta x}$$

As $\Delta x \to 0$

Louisa Button
21 Sept. 09

Ch 2 Review Problem

Find the limits as $h \to 0$:

a) $\frac{\sin^2 h}{h}$

$\frac{(\sin h)(\cancel{\sin h})}{\cancel{h}} = 1$

b) $\frac{\sin 5h}{5h}$ $\qquad x = 5h$

$\frac{\sin x}{x} = 1$

c) $\frac{\sin 5h}{h}$ $\qquad x = 5h$

$\frac{x}{5} = h$

$\frac{\sin x}{\frac{x}{5}}$

$\cancel{\sin x} \cdot \frac{5}{\cancel{x}} = 5$

d) $\frac{\sin h}{5h}$

$\frac{1}{5} \frac{\cancel{\sin h}}{\cancel{h}} = \frac{1}{5}$

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Ch 2 Problem

31. The height of a model rocket is $f(t) = t^3/(1+t)$.

a. what is the velocity $v(t)$?

b. What is the acceleration dv/dt?

a. $f(t) = t^3/(1+t)$

$$V(t) = \frac{(1+t)(3t^2) - (t^3)(1)}{(1+t)^2}$$

$$\frac{3t^2 + 3t^3 - t^3}{(1+t)^2}$$

$$\frac{2t^3 + 3t^2}{(1+t)^2} = V(t)$$

b. $$\frac{(1+2)^2(6t^2+6t) - (2t^3+3t^2)2(1+t)}{((1+t)^2)^2} = dv/dt$$

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Test Question in CH. 2

A good test question from chapter 2 is in § 2.6 number 25. It was in the homework and even after the whole delta, epsilon lecture I was somewhat lost until I did this problem and now it all makes sense.

$f(x) = 10x \quad \frac{|10x|}{10} < \frac{\frac{1}{100}}{10} \quad 0 < x < \delta \quad |x| < \frac{1}{1000} \quad \boxed{\delta = .001}$

$0 < x < \delta \quad f(x) = \sqrt{x} \quad |\sqrt{x}| < \frac{1}{100} \Rightarrow x < \frac{1}{10000} \quad \boxed{\delta = .0001}$

$0 < x < \delta \quad f(x) = \sin 2x \quad |\sin 2x| < \frac{1}{100} \quad \frac{\sin^{-1}(\frac{1}{100})}{2} = \frac{2x}{2} \quad \delta = \frac{\sin^{-1}(\frac{1}{100})}{2} = \boxed{.005}$

$f(x) = x \sin x \quad \frac{|x \sin x|}{x} < \frac{\frac{1}{100}}{x} \quad \sin x < \frac{1}{100x} \quad \sin^{-1}(\frac{1}{100x}) < x$

$0 < x < \delta \quad x < \delta = \boxed{.1}$

Chapter 2 Review Isaiah Davies

Question: 2.3 #20

Choose b, c, d so that the two parabolas $y=x^2+bx+c$ and $y=dx-x^2$ are tangent to each other at $x=1$, $y=0$

Answer:

$y=x^2+bx+c$

$y'=2x+b$

$y=dx-x^2$

$y'=d-2x$

$2x+b=d-2x$ ⇐ put in terms of d w/ $x=1$

$2+b=d-2$

$d=4+b$

$y=4+b(x)-x^2$ $x=1, y=0$

$0=4+b-1$

$\boxed{b=-3}$

$y=x^2+(-3)x+c$

$y=x^2-3x+c$ $y=0$ $x=1$

$0=1-3+c$

$\boxed{c=2}$

can Take d through from very start

$y=dx-x^2$ w/ $x=1, y=0$

$0=d-1$ $\boxed{d=1}$

Reason I chose question:

While this question may not be an "application" question or the most difficult, I really liked it because normally I am intimidated by problems that have multiple variables and require you to work forwards, then go backwards, much like this one, but I actually got through this one feeling confident after finishing it. I felt like I was in control of this problem with concepts that are very important and not the "easiest" but also not too complicated. It was a problem that clicked in my mind and made me enjoy doing my assignment, which doesn't happen often, so I chose it.