1. Teach these:

To solve these:

- Gradients
- Gradients
  - Either minimizing
  - Or maximizing some

4.5 Optimization problems

Exam a next week. Details at web page.
the expression without.

In order to maximize/minimize what value your input should have
sign chart it. This shows you
Third zero of the function, and

\[ \text{using constraints given.} \]

eliminate all but 1 input variable, input variable. So, try to
The function probably has more than 2
1) Alex to maximize volume, so I

2) $A = l \cdot w = w^2 \cdot y \rightarrow$ square back,

\[
\text{val} = A = l \cdot y
\]

\[
\text{red volume formula:}
\]

\[
\text{largest possible volume of box.}
\]

\[
\text{base and an open top. Find the used to make a box with a square}
\]

\[
4.5 \text{ cm}^2, 120 \text{ cm}^2, \text{ or material is to be}
\]
\[
3) \quad \frac{h}{A} = \frac{\frac{1}{3}(200 - \frac{5}{3}m^2)}{\frac{1}{3}(200 - \frac{5}{3}m^2)} = 300 - \frac{5}{3}m^2
\]

\[
A = \frac{4w^2 + 4wh + h^2}{200 - \frac{5}{3}m^2}
\]

So

\[h = \frac{4w^2 + 4wh + h^2}{200 - \frac{5}{3}m^2} = \frac{1200}{200 - \frac{5}{3}m^2}
\]

The area of material:

Other constraint:
\[ V_{120} = 6000 - 2000 = 4000 \text{ cm}^3 \]

\[ A'_{120} = 300 (20) - \frac{r}{2} (20)^3 \]

When \( V = 20 \)

When \( W = 20 \)

\[ \frac{dx}{dt} = \frac{m}{AP} \]
\[ D = \sqrt{ (x-0)^2 + (y-0)^2 } = \sqrt{x^2 + y^2} \]

Circle: Center \((x, y)\) to \((0, 0)\) is

\[ \frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 \]

\[ 1 = \frac{x^2}{b^2} + \frac{y^2}{c^2} \]

Given two lines \(y = mx + b\) and \(y = cx + a\) which are perpendicular:

\[ c^2 + b^2 = 9 \]

1. Find the point(s) on the ellipse.
For convenience, change function to

\[ f(x_1) = D^2 = (x-1)^2 + 4 - 4x^2 \]

\[ f(x_1) = D^2 = x^2 - 2x + 1 + 4 - 4x^2 \]

\[ = 5 - 2x - 3x^2 \]

\[ = (x-1)^2 + 4 - 4x^2 \]

\[ = (x-1)^2 + 4 - 4x^2 \]

\[ = (x-1)^2 + 4 - 4x^2 \]

\[ = (x-1)^2 + 4 - 4x^2 \]

\[ = (x-1)^2 + 4 - 4x^2 \]

\[ = (x-1)^2 + 4 - 4x^2 \]

So \( D = \sqrt{4x^2 + 4 - 4x^2} \)
To get the points on the ellipse:

1. Plug $x = -\frac{a}{2}$ into ellipse formula:

   \[ y = \pm \sqrt{\frac{b^2 - x^2}{a^2}} \]

2. So pts. furthest from (10) on ellipse are

\[
\left(-\frac{a}{2}, \frac{b}{2}\right) \quad \text{and} \quad \left(-\frac{a}{2}, -\frac{b}{2}\right)
\]
\[ \frac{\text{dist}}{\text{arc}} = \frac{4}{4} \text{ (hrs)} \]

So \[ T_2 = \frac{4}{4} \text{ hrs} \]

15 to C is 20, 20.

distance around arc from

20x-9

there, T.

want to minimize
\[
\frac{d}{dt} = -2 \sin(\theta) + 1
\]

To minimize this on \(0 \leq \theta \leq \frac{\pi}{2}\),

\[ T = T_1 + T_2 = 2 \cos \theta + \theta \]

so

\[ T_1 = \frac{4 \pi G}{2} \]

\[ \cos \theta = \frac{x}{2} \]

\[ \text{dist} = 2x = 4 \pi G \]

\[ x = 2 \cos \theta \]
ground.
So she should walk all the way.

\[ T(0) = 2 \cos(\pi) + 0 = 2 \]
\[ T(\frac{\pi}{2}) = 2 \cos(\frac{\pi}{2}) + 0 = 2 \]

The endpoint, \( t = 0 \text{ or } \theta = \frac{\pi}{2} \):
min. T actually occurs at one of

Hmm.