Appl. of Integration Review

particular – Solve for C

general – Leave C

#1–6) By hand
#7–16) CAS
#17–25) By hand

$$\int \frac{d^2y}{dx^2} = \int (6x-2)^5 \, dx$$

$u = 6x - 2$
$du = 6\,dx$

$$\frac{dy}{dx} = \int u^5 \cdot \frac{du}{6}$$

$$\int \frac{dy}{dx} = \int \frac{1}{6} \cdot \frac{u^6}{6} + C_1$$

$$\frac{1}{36}(6x-2)^6 + C_1$$

$$y = \int \frac{1}{36} \cdot u^6 \cdot \frac{du}{6} + \int C_1 \, dx$$

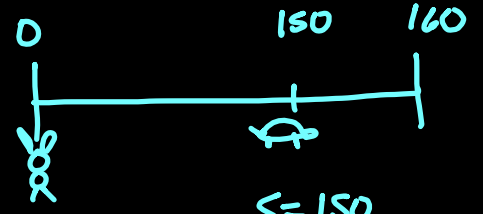
$$y = \frac{1}{216} \cdot \frac{u^7}{7} + C_1 x + C_2$$

$$y = \frac{1}{1512}(6x-2)^7 + C_1 x + C_2$$

Hare = 50 yds (150 ft.) behind turtle
accel. = at 3 ft/s²

Turtle = not accel.
0.5 ft/sec
10 ft. to finish

$s(t)$
$v(t) = s'(t)$
$a(t) = v'(t) = s''(t)$



$s = 0$
$v = 0$
$t = 0$
$a = 3$

$s = 150$
$v = 0.5$
$t = 0$
$a = 0$

Hare

$\int a(t) = \int 3$

$v(t) = 3t + C$

$0 = 0 + C$

$\boxed{v(t) = 3t}$

$s(t) = 1.5t^2 + C$

$0 \quad 0$

$\boxed{s(t) = 1.5t^2}$

$160 = 1.5t^2$

$\sqrt{\frac{320}{3}} = \sqrt{t^2}$

$10.33 = t$

Turtle

$v(t) = 0.5$

$s(t) = 0.5t + C$

$150 = 0 + C$

$s(t) = 0.5t + 150$

$160 = 0.5t + 150$

$10 = 0.5t$

$20 = t$ sec

$a = -32 \frac{ft}{s^2}$

$a = -9.8 \frac{m}{s^2}$

6 $\int \frac{dR}{dx} = \int$ marg Rev

$R =$ solve for C

Rev = $120,000

Sold = 2000

b) Profit = R − C − Maximize Profit

C) Optimization

1) Find critical pts
   $f'(x) = 0$
2) Set interval
3) Test interval pts + crit pts

(,) ← Limits

R(crit pt.)

[,]

left end
crit pt.
Rt. end

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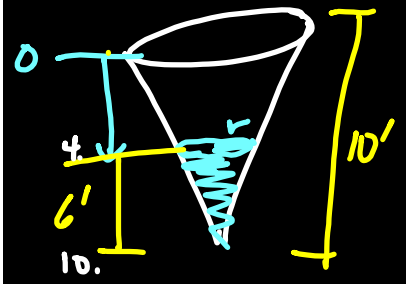
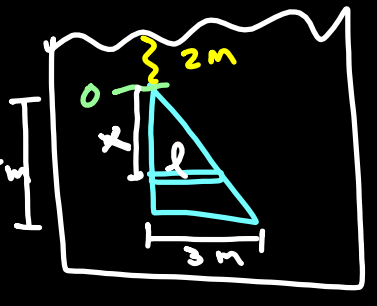
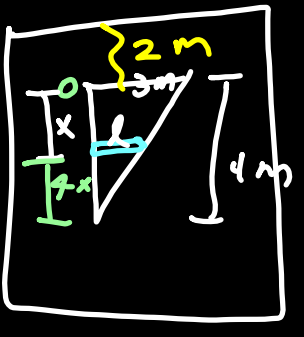
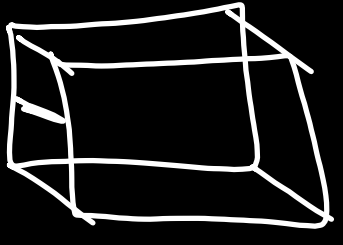
$F(x) = Kx$ (K: ↑, x: ↑ distance)

1) Write $\frac{d}{dx}$ hyperbolic functions









$\frac{l}{3} = \frac{x}{4}$ $\qquad$ $\frac{l}{3} = \frac{4-x}{4}$

$\rho = \frac{lb}{ft^3}$ or $\frac{N}{m^3}$

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