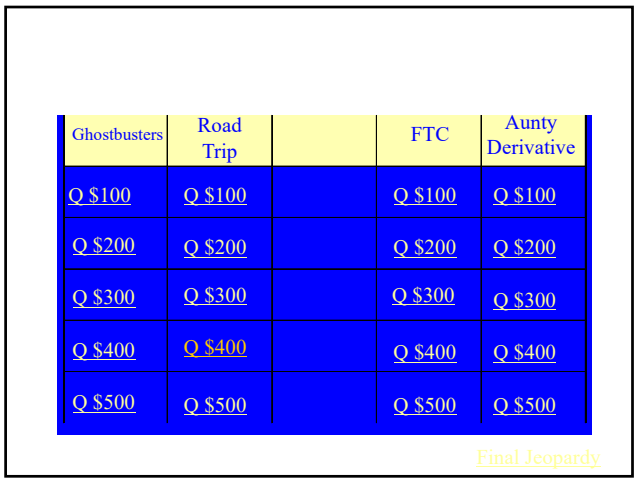
LET'S PLAY CALC-PARDY!!

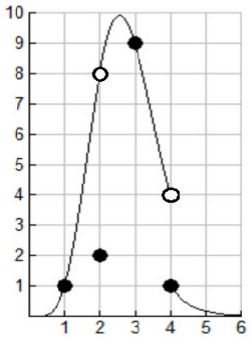
http://www.magicnet.net/~itms/jeopardy/index.htm



On the pages that follow, the questions are on the left hand column and the answers are on the right hand column.

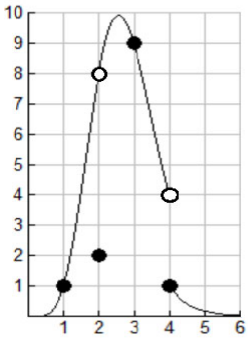
Fold the paper in half to work these problems.

$100 Question from Ghostbusters



At this value of *x* there is a removeable discontinuity

$100 Answer from Ghostbusters



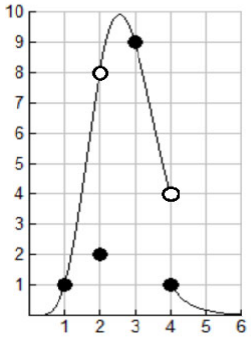
At $x = 2$
there is a *removeable* discontinuity

FYI:

At $x = 4$
there is a *jump* discontinuity

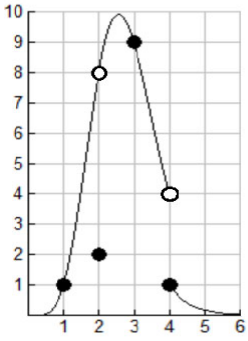
At vertical asymptotes there would b
a *jump* discontinuity

$200 Question from Ghostbusters



$$\lim_{x \to 2} f(x)$$

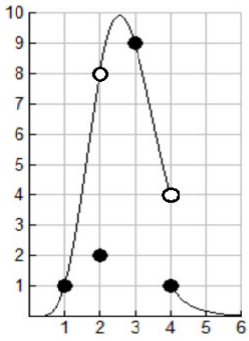
$200 Answer from Ghostbusters



$$\lim_{x \to 2} f(x) = 8$$

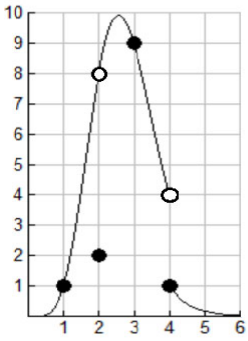
The limit as x approaches 2 is the *intended* value of the function.
The *actual* value of the function when x = 2 is *f*(2) = 2.

$300 Question from Ghostbusters



$$\lim_{x\to 4^+} f(x)$$

$300 Answer from Ghostbusters



$$\lim_{x\to 4^+} f(x) = 1$$

FYI:

$$\lim_{x\to 4^+} f(x) = 1$$

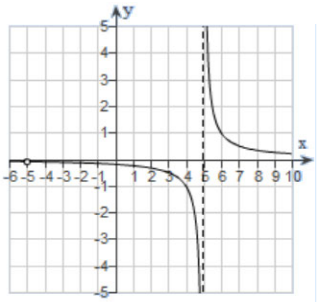
$$\lim_{x\to 4^-} f(x) = 4$$

$$\lim_{x\to 4} f(x) = \text{DNE}$$

$400 Question from Ghostbusters

$$\lim_{x\to 5^-} \frac{x+5}{x^2-25}$$

$400 Answer from Ghostbusters



$$\lim_{x\to 5^-} \frac{x+5}{x^2-25}$$

$$= \lim_{x\to 5^-} \frac{1}{x-5}$$

$$= -\infty$$

FYI:
There is an infinite discontinuity at $x = 5$ and a removeable discontinuity (hole) at $x = -5$.

$\lim_{x\to 5^+} \frac{1}{x-5} = \infty$ $\lim_{x\to 5} \frac{1}{x-5}$ does not exist.

$\lim_{x\to -5} \frac{1}{x-5} = \frac{1}{-5-5} = -\frac{1}{10}$

$500 Question from Ghostbusters

$$\lim_{x\to 0}\frac{e^x-\sin x-1}{x^3+7x^2}$$

$500 Answer from Ghostbusters

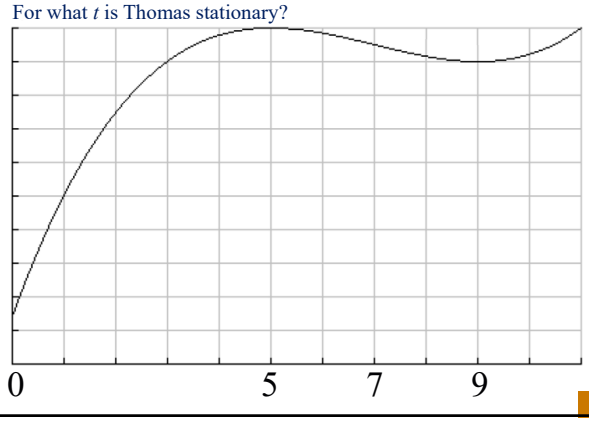
$$\lim_{x\to 0}\frac{e^x-\sin x-1}{x^3+7x^2} \overset{LH}{=} \lim_{x\to 0}\frac{e^x-\cos x}{3x^2+14x} \overset{LH}{=} \lim_{x\to 0}\frac{e^x+\sin x}{6x+14} = \frac{1+0}{0+14} = \frac{1}{14}$$

$$\frac{1-0-1}{0} \qquad \frac{1-1}{0} \qquad \frac{1+0}{}$$

$$\sin 0 = 0$$
$$\cos 0 = 1$$
$$e^0 = 1$$

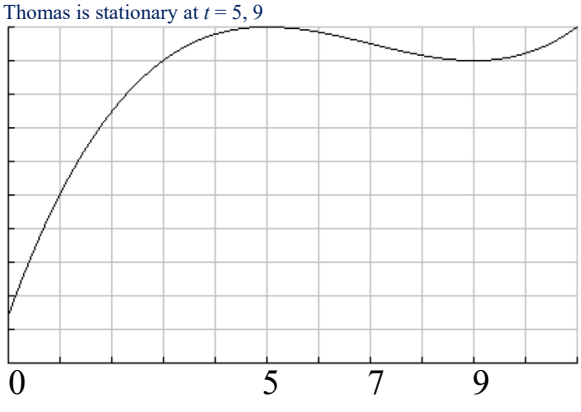
$100 Question from Road Trip

Thomas' distance **away** from Sir Hatt after t minis shown.
For what t is Thomas stationary?



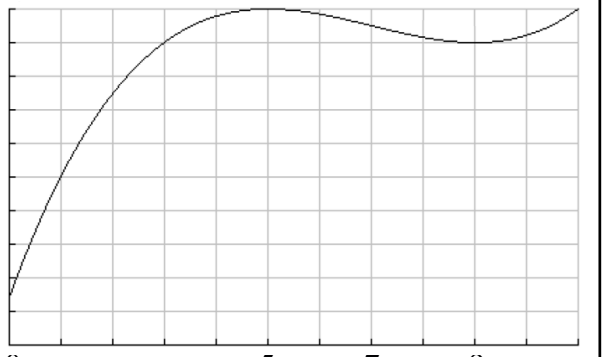
$100 Answer from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
Thomas is stationary at t = 5, 9



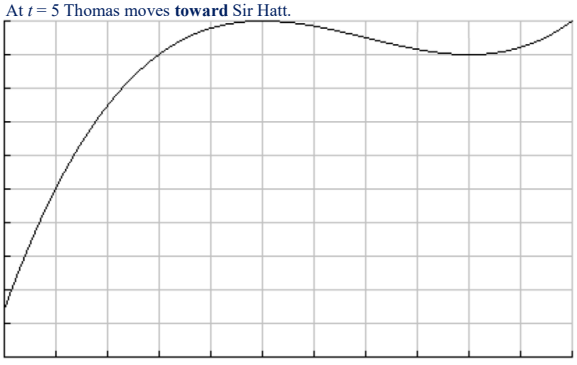
$200 Question from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
At $t = 5$ what does Thomas do?



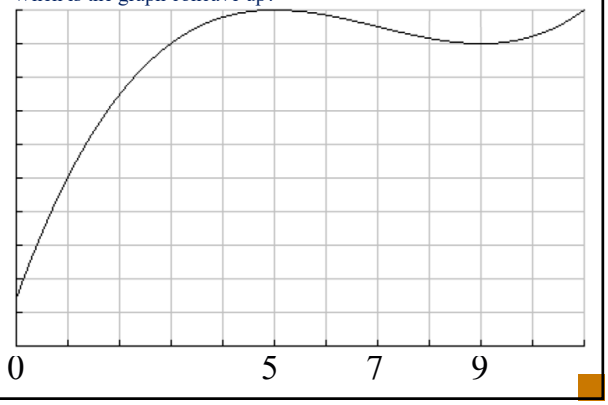
$200 Answer from Road Trip

Thomas' distance **away** from Sir Hatt after t minis shown.
At $t = 5$ Thomas moves **toward** Sir Hatt.



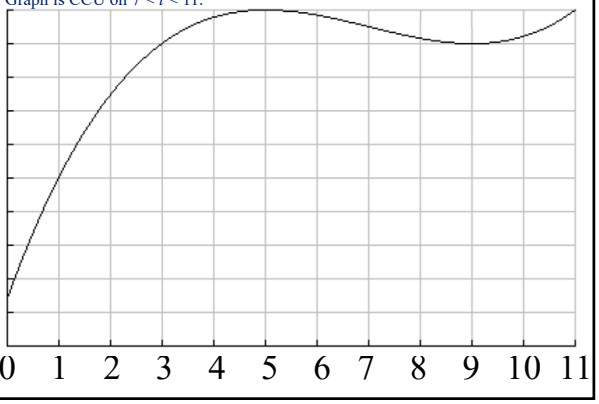
$300 Question from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
When is the graph concave up?



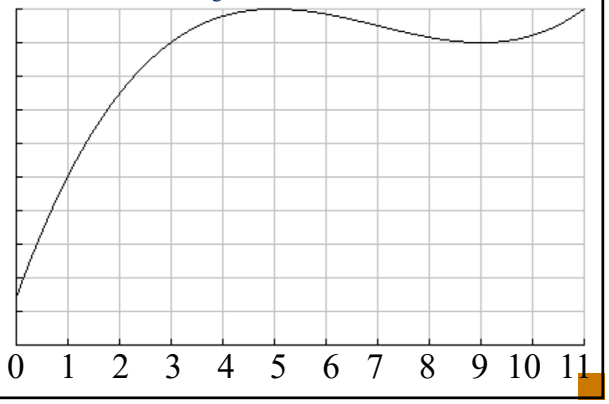
$300 Answer from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
Graph is CCU on $7 < t < 11$.



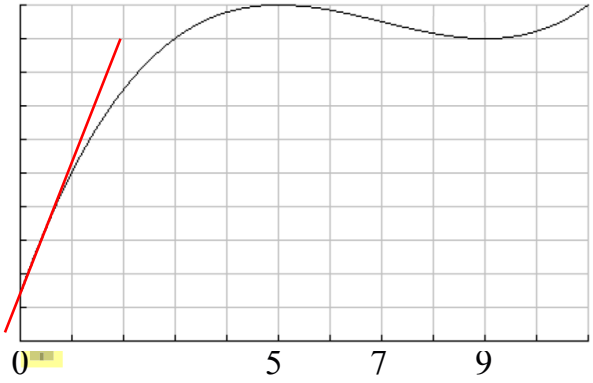
$400 Question from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
When is Thomas moving the fastest?



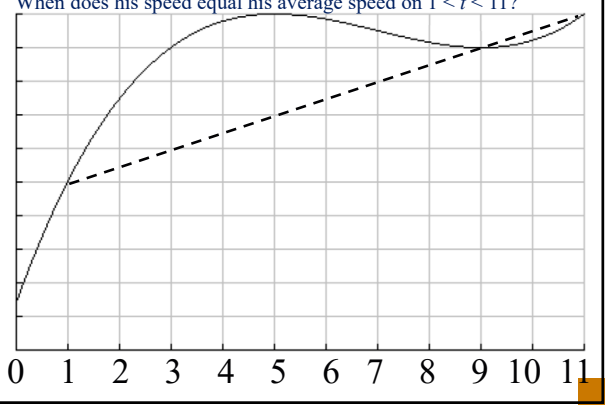
$400 Answer from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
Thomas is fastest at $t = 0$.



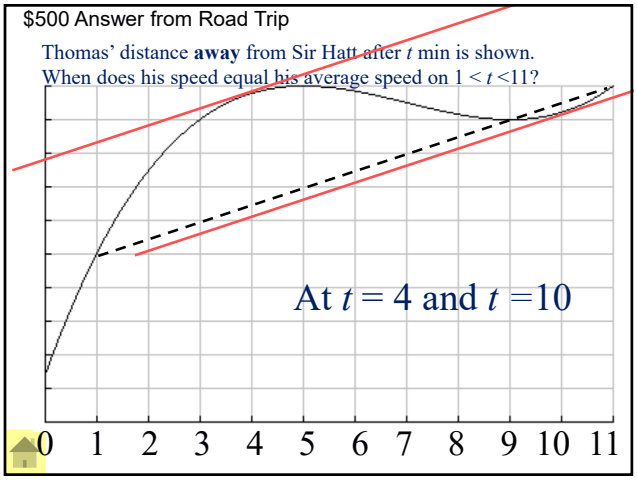
$500 Question from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
When does his speed equal his average speed on $1 < t < 11$?



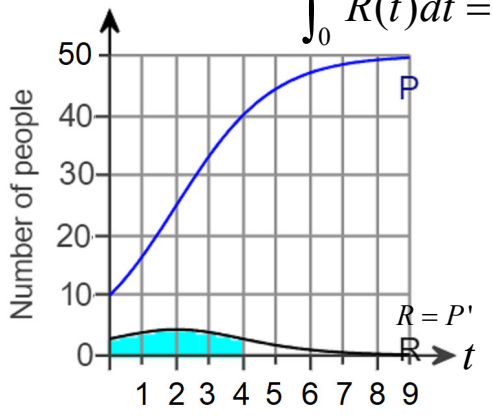
$500 Answer from Road Trip

Thomas' distance **away** from Sir Hatt after t min is shown.
When does his speed equal his average speed on $1 < t < 11$?



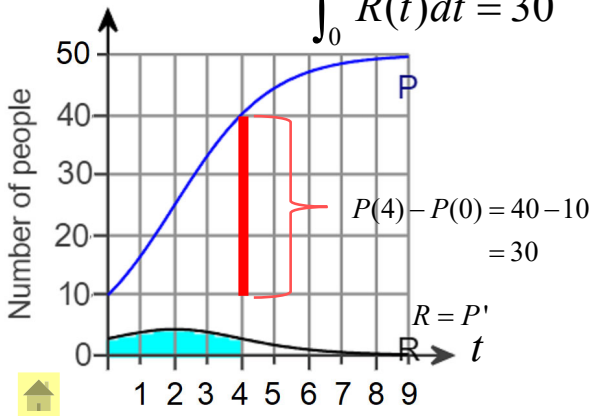
$100 Question from FTC

$$\int_0^4 R(t)\,dt = ?$$



$100 Answer from FTC

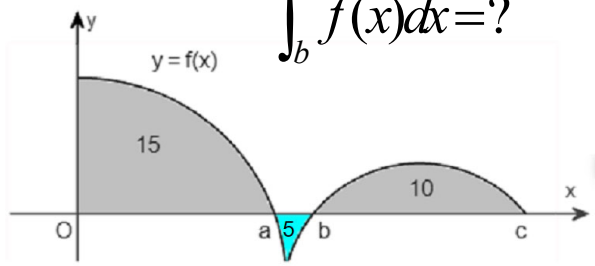
$$\int_0^4 R(t)\,dt = 30$$



$$P(4) - P(0) = 40 - 10 = 30$$

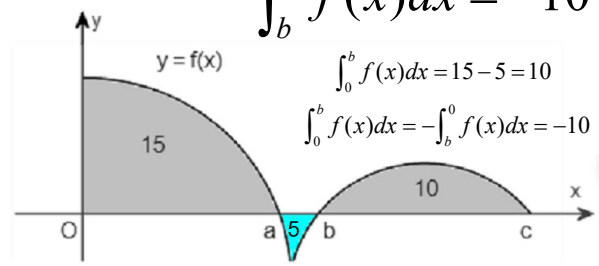
$200 Question from FTC

$$\int_b^0 f(x)\,dx = ?$$



$200 Answer from FTC

$$\int_b^0 f(x)\,dx = -10$$



$$\int_0^b f(x)\,dx = 15 - 5 = 10$$

$$\int_0^b f(x)\,dx = -\int_b^0 f(x)\,dx = -10$$

$300 Question from FTC

$$\int_0^4 P'(t)dt$$

Time, t (years)	Profit, P (thousands of dollars)	Marginal Profit, P′ (thousands of dollars per year)
0	− 6	− 48
1	− 29	0
2	− 10	36
3	39	60
4	106	72

$300 Answer from FTC

Time, t (years)	Profit, P (thousands of dollars)	Marginal Profit, P′ (thousands of dollars per year)
0	− 6	− 48
1	− 29	0
2	− 10	36
3	39	60
4	106	72

$$\int_0^4 P'(t)dt = P(4) - P(0) = 106 - (-6) = 112$$

$400 Question from FTC

$$g(x) = \int_9^x \ln(\sin(e^{t^3}))dt$$

What is $g'(x)$?

$400 Answer from FTC

$$g(x) = \int_9^x \ln(\sin(e^{t^3}))dt$$

$$g'(x) = \ln(\sin(e^{x^3}))$$

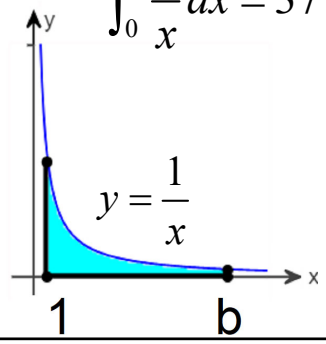
By FTC we have $g(x) - g(9) = \int_9^x g'(t)dt$

Notice the integrand is $g'(t)$:

$500 Question from FTC

What is the exact value of b?

$$\int_0^b \frac{1}{x}\,dx = 37$$



$500 Answer from FTC

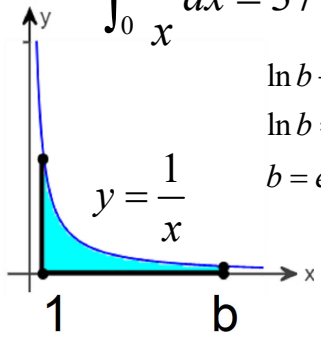
What is the exact value of b?

$$\int_0^b \frac{1}{x}\,dx = 37$$

$$\ln b - \ln 1 = 37$$

$$\ln b = 37$$

$$b = e^{37}$$



$100 Question from Aunty Derivative

$$\int \frac{1}{x-3}\,dx$$

$100 Answer from Aunty Derivative

$$\int \frac{1}{x-3}\,dx = \ln|x-3| + C$$

$200 Question from Aunty Derivative

In terms of x please

$$\int \cos 4x dx$$

$200 Answer from Aunty Derivative

$$\int \cos 4x dx = \frac{1}{4}\int \cos 4x \, 4dx$$

$$= \frac{1}{4}\int \cos u \, du$$

$$= \frac{1}{4}\sin u + C$$

$$= \frac{1}{4}\sin 4x + C$$

$300 Question from Aunty Derivative

$$\int \frac{dx}{\sqrt{1-16x^2}}$$

$300 Answer from Aunty Derivative

$$\int \frac{1}{\sqrt{1-16x^2}}dx = \int \frac{1}{\sqrt{1-(4x)^2}}dx$$

Let $u = 4x$
Then $du = 4dx$
so $\frac{du}{4} = \boldsymbol{dx}$

$$\int \frac{1}{\sqrt{1-16x^2}}dx = \int \frac{1}{\sqrt{1-(4x)^2}}dx = \int \frac{1}{\sqrt{1-(u)^2}}\cdot\frac{du}{4} = \frac{1}{4}\int \frac{1}{\sqrt{1-(u)^2}}\cdot du$$

$$\frac{1}{4}\int \frac{1}{\sqrt{1-u^2}}\cdot du = \frac{1}{4}\sin^{-1}u + C = \frac{1}{4}\sin^{-1}(4x) + C$$

$400 Question from Aunty Derivative

$$\int (1-t)e^{36t-18t^2}\,dt$$

$400 Answer from Aunty Derivative

$\int (1-t)e^{36t-18t^2}dt$ Let $u = 36t - 18t^2$

Then $du = (36 - 36t)dt$

$du = 36(1-t)dt$ so $\frac{du}{36} = (1-t)dt$

$\int (1-t)e^{36t-18t^2}dt = \int e^{36t-18t^2}(1-t)dt = \int e^u \frac{du}{36} = \frac{1}{36}\int e^u du$

$= \frac{1}{36}e^u + C = \frac{1}{36}e^{36t-18t^2} + C$

$500 Question from Aunty Derivative

Exact value please

$$\int_0^{1000} e^{-2x}\,dx$$

$500 Answer from Aunty Derivative

Exact value please

$$\int_0^{1000} e^{-2x}\,dx$$

$$\int e^{-2x}dx = -\frac{1}{2}\int e^{-2x}(-2)dx = -\frac{1}{2}e^{-2} + C$$

$$\int_0^{1000} e^{-2x}(-2)dx = -\frac{1}{2}e^{-2}\Big|_0^{1000} = -\frac{1}{2}e^{-2000} - (-\frac{1}{2}e^0)$$

$$= -\frac{1}{2}e^{-2000} + \frac{1}{2}$$