AP Calculus

HW Solutions

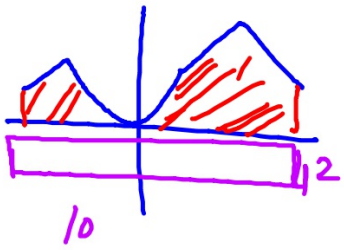
p 288 #6-30(x3) just check 'em w/ a calculator!

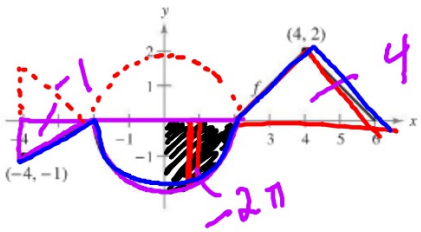
67.

x=2 -6

x=5 15

x=8 72





(a) $\int_0^2 f(x)\,dx$ (b) $\int_2^6 f(x)\,dx$

(c) $\int_{-4}^2 f(x)\,dx$ (d) $\int_{-4}^6 f(x)\,dx$

(e) $\int_{-4}^6 |f(x)|\,dx$ (f) $\int_{-4}^6 [f(x)+2]\,dx$

p274 #47

a. -π (quarter of a circle w/ radius 2)

b. 4 (area of triangle)

c. -1-2π (tri + half circle)

d. -1-2π+4 = 3-2π

e. 1+2π+4 = 5+2π

f. (3-2π)+10*2 = 23-2π

30.) $\int_0^{\pi/4} \frac{\sec^2\theta}{\tan^2\theta+1}\,d\theta$

$\int_0^{\pi/4} \sec^2\theta \cdot \frac{1}{1^2+(\tan\theta)^2}\,d\theta$

$\int \frac{1}{a^2+u^2}\,du = \frac{1}{a}\arctan\frac{u}{a}+C$

$= \left[\frac{1}{1}\cdot \arctan\left(\frac{\tan\theta}{1}\right)\right]_0^{\pi/4}$

$\left[\theta\right]_0^{\pi/4}$

$\frac{\pi}{4} - 0 = \boxed{\pi/4}$

24) $\int_1^4 3 - |x-3| \, dx$

Definite Integral:

- Is a number
- Calculates area under curve (between function and x-axis)
- Can accumulate net change/displacement
- Sum of infinite rectangles

Practice Assessment: #7

I-A5

7. $\int_3^4 -\frac{2}{2x-2}\,dx$ $= -1\int_3^4 \frac{-2}{-1}\cdot\frac{1}{2x-2}\,dx = -1\int_3^4 2\,\frac{1}{2x-2}\,dx$

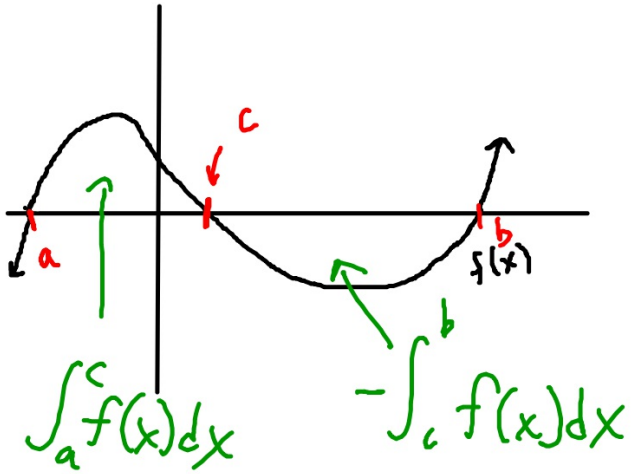
$-1\left[\ln|2x-2|\right]_3^4$

$-1\left[\ln|2\cdot 4-2| - \ln|2\cdot 3-2|\right]$

$-1(\ln 6 - \ln 4) \approx -0.405$

How do you find the area under a curve?

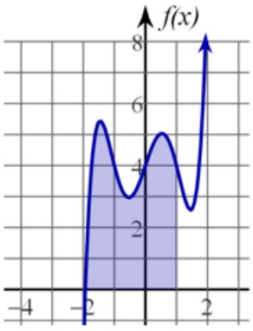
$$\int_a^b f(x)\,dx$$



Practice Assessment: #6

I-A4a

6. Find the area of the region bounded by $f(x) = x^5 - 4x^3 + 3x + 4$, the x-axis, and the lines $x = -2$ and $x = 1$.



12

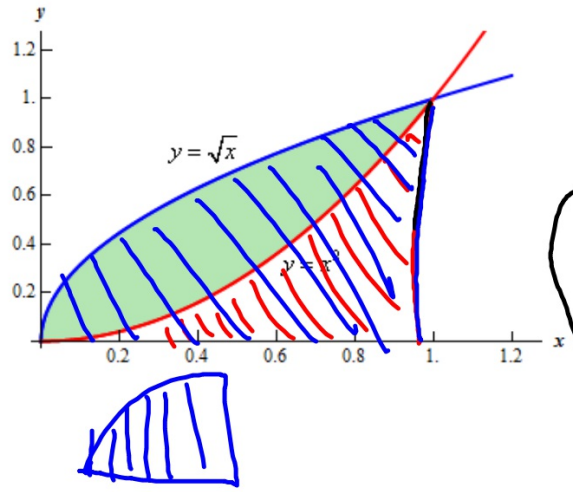
$$\int_{-2}^{1} x^5 - 4x^3 + 3x + 4 \, dx$$

$$\left[\frac{1}{6}x^6 - x^4 + \frac{3}{2}x^2 + 4x\right]_{-2}^{1}$$

$$\frac{1}{6}(1)^6 - (1)^4 + \frac{3}{2}(1)^2 + 4(1) - \left(\frac{1}{6}(-2)^6 - (-2)^4 + \frac{3}{2}(-2)^2 + 4(-2)\right)$$

$$\frac{14}{3} - \left(-\frac{22}{3}\right) \rightsquigarrow \frac{36}{3} \rightarrow 12$$

Okay...How do you find the area of...this?



Area between 2 curves

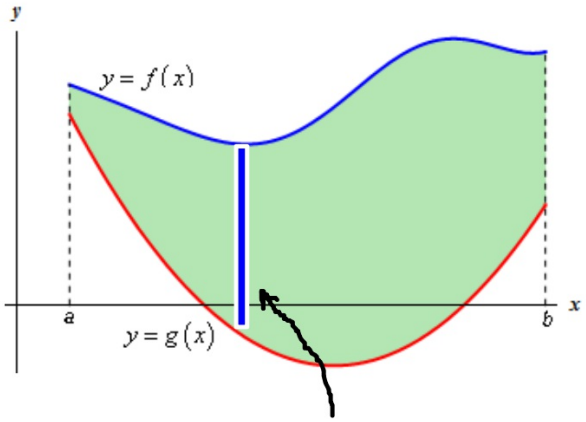
$$\int_0^1 \sqrt{x}\,dx - \int_0^1 x^2\,dx$$

Area under top minus Area under bottom.

[Area under top minus bottom]

$$\int_0^1 \sqrt{x} - x^2\,dx$$

Even when some regions are negative:



height of this rectangle: f(x) - g(x)

base of this rectangle: delta x

therefore area of entire region is sum of infinite rectangles

$$\int_a^b f(x)-g(x)\,dx$$

Area Worksheet: #2 and 6

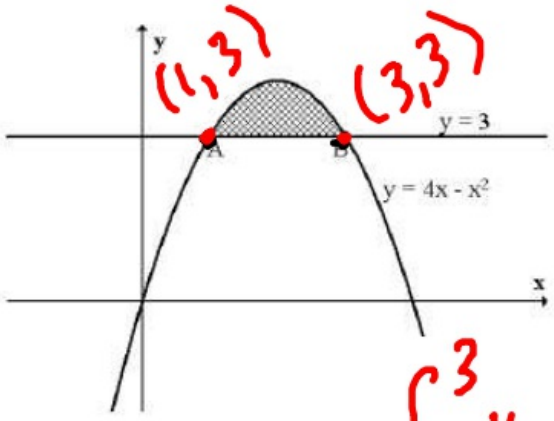
Area Between Two Curves Method:

$4x - x^2 = 3$

1. The diagram opposite shows the curve $y = 4x - x^2$ and the line $y = 3$.

   (a) Find the coordinates of A and B.

   (b) Calculate the shaded area.



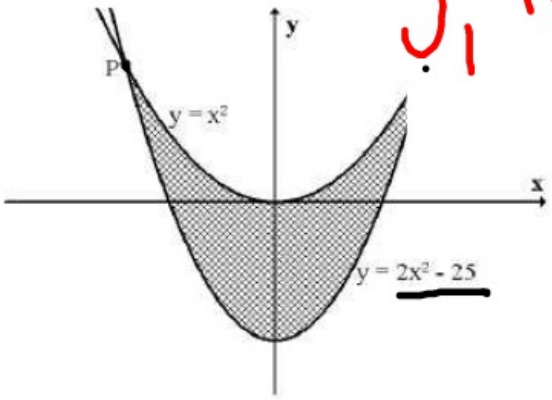
$4x - x^2 - 3 = 0$ $\quad x=1 \quad x=3$

$0 = x^2 - 4x + 3 = (x-1)(x-3)$

$\int_1^3 4x - x$

2. The curves with equations $y = x^2$ and $y = 2x^2 - 25$ intersect at P and Q.

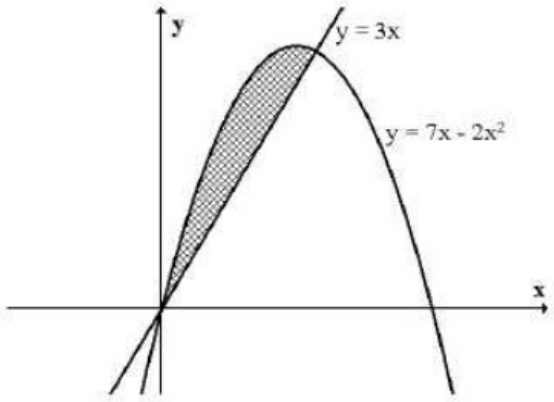
   Calculate the area enclosed between the curves.



$\int_?^? x^2 - (2x^2 - 25)\,dx$

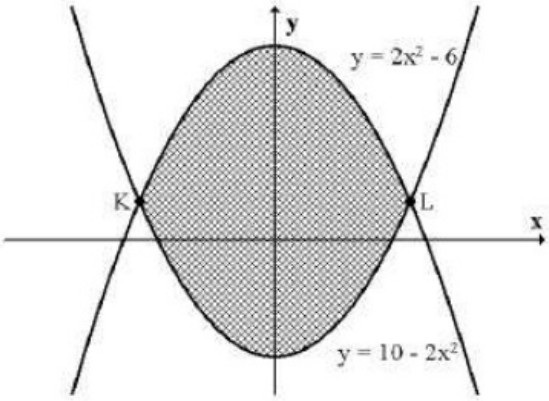
3. The diagram opposite shows the curve $y = 7x - 2x^2$ and the line $y = 3x$.

   Calculate the shaded area.



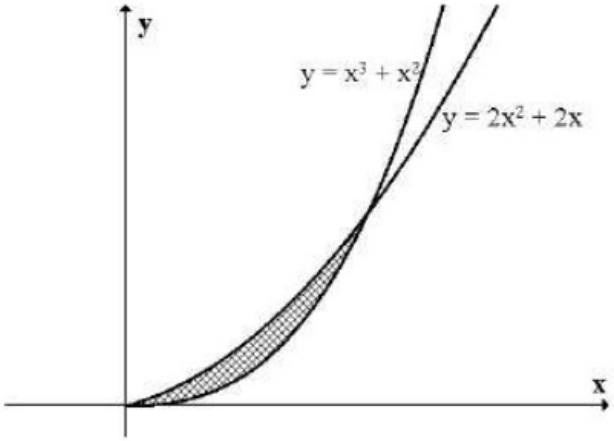
4. The curves with equations $y = 2x^2 - 6$ and $y = 10 - 2x^2$ intersect at K and L.

   Calculate the area enclosed by these two curves.



5. The diagram opposite shows part of the curves $y = x^3 + x^2$ and $y = 2x^2 + 2x$.

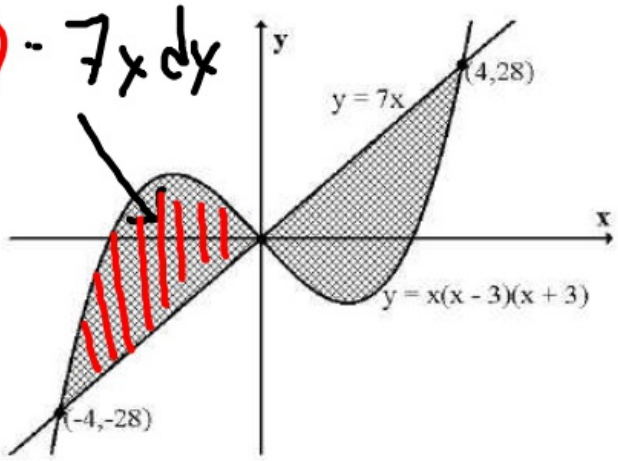
Calculate the shaded area.

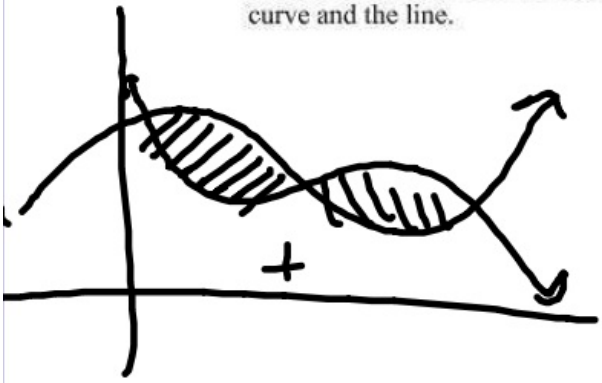


$$2 \cdot \int_{-4}^{0} x(x-3)(x+3) - 7x\,dx$$

6. The curve $y = x(x - 3)(x + 3)$ and the line $y = 7x$ intersect at the points (0,0), (-4,-28) and (4,28).

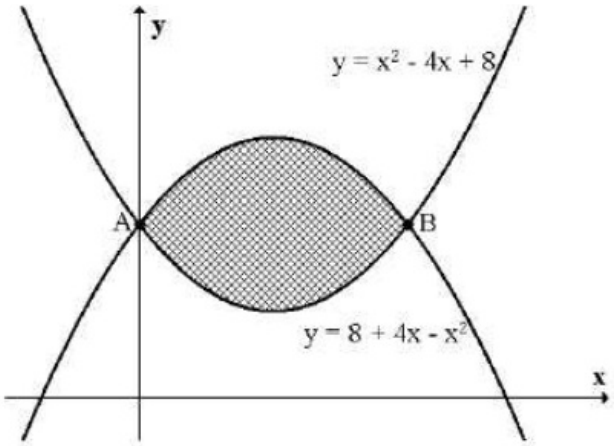
Calculate the area enclosed by the curve and the line.





7. The parabolas $y = x^2 - 4x + 8$ and $y = 8 + 4x - x^2$ intersect at A and B.

(a) Find the coordinates of A and B.
(b) Calculate the shaded area.



Big Assessment: Next Monday 2/29

Hw:
- Work on practice assessment for big honkin' assessment 2/29
- Finish area between two curves worksheet for Friday
- Test corrections due Weds