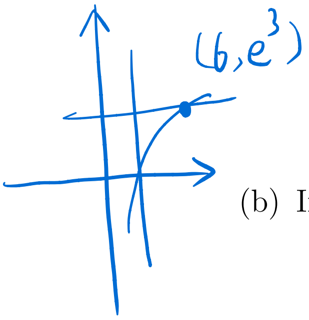
5. Let **R** be the finite region bounded by $y = 2\ln x$, $y = 6$ and $x = 1$. In the following manner, set up but do not evaluate definite integrals which represent the area of the region **R**.

(a) Integrate with respect to x.

$$\int_1^{e^3} 6-2\ln x \, dx$$



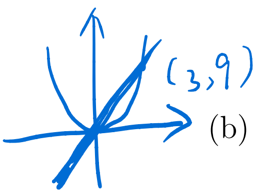
(b) Integrate with respect to y. (The integrands in parts (a) and (b) should be different.)

$$\int_0^6 e^{\frac{y}{2}} - 1 \, dy$$

6. Let **R** be the finite region bounded by $f(x) = x^2$ and $g(x) = 3x$. In the following manner, set up and evaluate definite integrals which represent the area of the region **R**.

(a) Integrate with respect to x.

$$\int_0^3 3x - x^2 \, dx = \frac{3x^2}{2} - \frac{x^3}{3}\Big|_0^3 = \frac{9}{2}$$



(b) Integrate with respect to y. (The integrands in parts (a) and (b) should be different.)

$$\int_0^9 \sqrt{y} - \frac{y}{3} \, dy = \frac{2}{3} y^{\frac{3}{2}} - \frac{y^2}{6}\Big|_0^9 = \frac{9}{2}$$

7. Evaluate the following indefinite integrals.

(a) $\int \cot x dx$

$= \int \frac{\cos x}{\sin x} dx$, Let $u = \sin x$.

(b) $\int x\sqrt{2x+1}dx$

Let $u = \sqrt{2x+1}$.

(c) $\int \cos^3(x)dx$

$= \int \cos x(\cos^2 x)dx = \int \cos x(1-\sin^2 x)dx$.

Let $u = \sin x$.

(d) $\int \frac{50x^9 \cos(x^{10})}{\sin(x^{10})} dx$

Let $u = x^{10}$, then use part a).

(e) $\int \frac{6x^5}{x^3+1}dx$

$= \int \frac{6x^5+6x^2-6x^2}{x^3+1}dx = \int x^2 dx - \int \frac{6x^2}{x^3+1}dx.$

For second term, let $u = x^3+1$.