Calculus I
Practice Problems 10

1. $\int_1^3 (2t+1)^3 dt =$

2. $\int_{-1}^1 (4x^3 - 2x^2 + 1) dx =$

3. Calculate the definite integrals:

   a) $\int_{-4}^4 (x^2 - 3 + \cos x) dx$

   b) $\int_0^{\pi/4} \frac{\sin x}{\cos^3 x} dx$

4. Integrate:

   a) $\int_1^4 \frac{1}{\sqrt{y}(\sqrt{y}+1)^2} dy$

   b) $\int_0^{\pi/2} \cos^2 x \sin x dx$

5. Evaluate

   a) $\frac{d}{dx} \int_0^{2x+1} \cos t dt$

   b) $\frac{d}{dx} \int_0^{x^2} t^3 dt$

6. Find the area of the region bounded by the curves $y = x - x^3$ and $y = x^2 - x$.

7. Find the area of the region in the first quadrant bounded by the curves $y = \sin \frac{\pi}{2} x$ and $y = x$.

8. Find the area of the region under the curve $y = x\sqrt{x^2+1}$, above the x-axis and bounded by the lines $x = 1$ and $x = 3$.

9. Find the area under the curve $y = x^2 + x^{-2}$, above the x-axis and between the lines $x = 1$ and $x = 2$.

10. What is the area of the region bounded by the curves $y = x^3 - x$ and $y = 3x$?