Integration

1. $\int dx$
2. $\int 2x^3 dx$
3. $\int (ax + bx^2) dx$
4. $\int x^{-1} dx$
5. $\int \frac{x^2+1}{x} dx$
6. $\int_0^1 x dx$
7. $\int \frac{1}{2x+1} dx$
8. $\int \frac{x}{3x-2} dx$
9. $\int \frac{3x^2+1}{3x^3+3x} dx$
10. $\int e^x dx$
11. $\int_0^{\ln 2} e^x dx$
12. $\int e^{3x} dx$
13. $\int_0^{\ln 2} e^{3x} dx$

14. $\int \frac{x^2+xe^{2x}}{x}dx$

15. $\int \frac{\ln x}{x}dx$

16. $\int \frac{\ln x+1}{x}dx$

17. $\int 2xe^{x^2}dx$

18. $\int (3x^2+2x)e^{x^3+x^2}dx$

19. $\int 2xe^{x}dx$

20. $\int 2xe^{2x}dx$

21. $\int x^2e^{x}dx$

22. $\int x^3e^{x^2}dx$

23. $\int_1^{e^2} \ln x dx$

24. $\int x\ln x dx$

25. $\int x(3-x)^3dx$

26. $\int (2x+3)^2(3x+5)^3dx$

27. $\int \frac{e^{\frac{1}{x^2}}}{x^3} dx$

28. $\int \frac{e^{\frac{1}{x^5}}}{x^6} dx$

29. $\int \frac{1}{\sqrt{6x+5}} dx$

30. $\int \frac{(\sqrt{x}+1)^{\frac{1}{2}}}{\sqrt{x}} dx$

Partial Derivatives

Calculate the second partials, including the mixed partials, of the following functions. In addition, evaluate which points are critical points or saddle points, and determine the relative extrema (relative maximum or minimum).

1. $f(x, y) = x + y$

2. $f(x, y) = xy$

3. $f(x, y) = x^2 + 2xy + y^2$

4. $f(x, y) = e^{x^2+y^2}$

5. $f(x, y) = e^{xy}$

6. $f(x, y) = xye^{xy}$

7. $f(x, y) = \ln(x + y)$

8. $f(x, y) = x \ln(3x^2y)$