

6pts 1. Find  $\int (e^{7x} + 6x^2 + 2x + 1/x) dx$

6pts 2. Find  $\int (9x^8 + 12x^3 + 1/x^3) dx$

6pts 3. Find a function with the following properties  $f'(x) = (7/3)x^{4/3}$  and  $f(1) = 5$ .

6pts 4. Find the fourth Riemann sum of  $3x + 4$  on  $[3, 23]$  using left endpoints.

6pts 5. Find  $\int_1^4 (5x^4 + 3x^2 + 4x + 2)dx$

6pts 6. Find  $\int_1^5 9e^{3x} dx$

6pts 7. Find the area of the region bounded by the curves  $y = x^2 - 5x + 6$  and  $y = 2x - 4$

6pts 8. Find the consumer surplus for the demand at the given sales level  $x$   
 $p = 3 - (x/10)$  at  $x = 20$

6pts 9. If  $f(x,y) = 7x^5 - 6x^3y + 3x^2 + 7y - 3$  find  $f(1, 2)$

6pts 10. Sketch level curves for  $f(x, y) = 4$  and  $f(x, y) = 9$  if  $f(x, y) = x^2 + y$

10pts 11. Use a second derivative test for bivariates to determine all local extrema for  
 $f(x, y) = 3x^2 - 4xy + 3y^2 + 8x - 17y + 30$

6pts 12. Find  $\int (12x^2 + 20x)(2x^3 + 5x^2 + 5)^9 dx$

6pts 13. Find  $\int xe^{8x} dx$

6pts 14. Find  $\int (x^{20} \ln 3x) dx$

6pts 15. Find  $\int 8x\sqrt{x^2 - 9} dx$

6pts 16. Find  $\int 8x^3 e^{x^4} dx$

FORMULAS

1.  $\frac{b-a}{n} \sum f(x_i)$

2.  $\int [f(x) - B] dx$

3.  $\int_0^{x_0} [p(x) - p_0] dx$

4.  $\int f(x) g'(x) dx = f(x) g(x) - \int f'(x) g(x) dx$

5.  $d/dx[\ln g(x)] = \frac{g'(x)}{g(x)}$

6.  $d/dx[e^{g(x)}] = e^{g(x)} g'(x)$

BIVARIATE SECOND DERIVATIVE TEST

Let  $f$  be a bivariate function and suppose  $f_x(a,b) = 0$  and  $f_y(a,b) = 0$

$$\text{Let } D = f_{xx}(a,b)f_{yy}(a,b) - [f_{xy}(a,b)]^2$$

a) If  $D > 0$  and  $f_{xx}(a,b) > 0$  then  $f(x,y)$  has local min at  $(a,b)$

b) If  $D > 0$  and  $f_{xx}(a,b) < 0$  then  $f(x,y)$  has local max at  $(a,b)$

c) If  $D < 0$  then  $f(x,y)$  does not have an extremum at  $(a,b)$

d) If  $D = 0$  then test is inconclusive