

Answers to the sample problems for Test 3

1. (a) $2e^{\sqrt{x}} + C$
 (b) $\frac{1}{4} \ln |x^4 - 12x + 3| + C$
 (c) $\frac{1}{3}(\ln x)^3 + C$
 (d) $\frac{1}{16} \frac{1}{(5 - 2x^2)^4} + C$
 (e) $-6\sqrt{3-x} + \frac{2}{3}(3-x)^{3/2} + C$
 (f) $\frac{1}{2}e^{2x-1} + C$
2. $R(x) = 40x - 0.001x^2 + 200\ln|x+1|$, $R(1000) = 40381.75$.
3. $\Delta x = 0.5$; partition numbers are $x_0 = 2$, $x_1 = 2.5$, $x_2 = 3$, $x_3 = 3.5$, $x_4 = 4$, $x_5 = 4.5$, $x_6 = 5$;
 $L_6 = -3.5315$, $R_6 = -0.9065$.
4. (a) $2(A^2 + 1)^8 - 2$
 (b) $1.5434 - \frac{5}{2}B^2 + \frac{16}{9}B^{9/4}$
5. $f_{\text{ave}} = -4$.
6. (a) $A = 6.944$
 (b) $A = 8$
 (c) $A = \frac{8}{3}$.
7. $\bar{x} = 150$, $\bar{p} = 40$, $CS = 2250$, $PS = 2700$.
8. $\frac{203}{9}$.
9. $R(x, y) = 20x - 0.005x^2 - 0.002xy + 15y - 0.003y^2$, $R(7, 3) = 184.686$.
10. $x = 4$: $z = -51 + 16y + 15y^2$ parabola. $y = 2$: $z = 65 + 18x - 6x^2$ parabola.
11. (a) $f_x = \frac{2y(1 - x^2y^2)}{(1 + x^2y^2)^2}$, $f_y = \frac{2x(1 - x^2y^2)}{(1 + x^2y^2)^2}$
 (b) $f_x = \frac{1}{\sqrt{2x - y^2}}$, $f_y = -\frac{y}{\sqrt{2x - y^2}}$
 (c) $f_x = (1 + x\sqrt{y})e^{x\sqrt{y}}$, $f_y = \frac{1}{2} \frac{x^2}{\sqrt{y}} e^{x\sqrt{y}}$
12. $f_x = -12x^2y^5 + 54x^5y^2$,
 $f_y = -20x^3y^4 + 18x^6y$,
 $f_{xx} = -24xy^5 + 270x^4y^2$,
 $f_{xy} = 60x^2y^4 + 108x^5y$,
 $f_{yy} = -80x^3y^3 + 18x^6$
13. test fails at $(0,0)$; f has saddle points at $(2, 2)$ and $(2, -2)$.