

Math 127 Review – Test 2

Chapter 14 Review

35. If $w = \sqrt{x} + y^2/z$, where $x = e^{2t}$, $y = t^3 + 4t$, and $z = t^2 - 4$, use the Chain Rule to find dw/dt .

36. If $z = \cos xy + y \cos x$, where $x = u^2 + v$ and $y = u - v^2$, use the Chain Rule to find $\partial z/\partial u$ and $\partial z/\partial v$.

40. The length x of a side of a triangle is increasing at a rate of 3 in/s, the length y of another side is decreasing at a rate of 2 in/s, and the contained angle θ is increasing at a rate of 0.05 radian/s. How fast is the area of the triangle changing when $x = 40$ in, $y = 50$ in, and $\theta = \pi/6$?

46. Find the directional derivative of $f(x, y, z) = x^2y + x\sqrt{1+z}$ at the point $(1, 2, 3)$ in the direction of $\mathbf{v} = 2\mathbf{i} + \mathbf{j} - 2\mathbf{k}$.

48. Find the direction in which $f(x, y, z) = ze^{xy}$ increases most rapidly at the point $(0, 1, 2)$. What is the maximum rate of increase?

54. Find the local maximum and minimum values and saddle points of the function $f(x, y) = (x^2 + y)e^{y/2}$.

15.3: 37 Sketch the region of integration and change the order of integration.

$$\int_0^4 \int_0^{\sqrt{x}} f(x, y) dy dx$$

15.8: 29 (mod.) Find the volume of the solid E that lies above the cone $z = \sqrt{x^2 + y^2}$ and below the sphere $x^2 + y^2 + z^2 = 1$.

Chapter 15 Review

13. Calculate the iterated integral by first reversing the order of integration.

$$\int_0^1 \int_x^1 \cos(y^2) dy dx$$

22. Evaluate $\iint_D x dA$, where D is the region in the first quadrant that lies between the circles $x^2 + y^2 = 1$ and $x^2 + y^2 = 2$.

27. Evaluate $\iiint_E yz dV$, where E lies above the plane $z = 0$, below the plane $z = y$, and inside the cylinder $x^2 + y^2 = 4$.

30. Find the volume of the solid under the surface $z = x^2y$ and above the triangle in the xy -plane with vertices $(1, 0)$, $(2, 1)$, and $(4, 0)$.

16.1: 24 Find the gradient vector field of $f(x, y, z) = x \cos(y/z)$.

16.2: 22 Evaluate the line integral $\int_C \mathbf{F} \cdot d\mathbf{r}$, where $\mathbf{F}(x, y, z) = z\mathbf{i} + y\mathbf{j} - x\mathbf{k}$ and C is given by the vector function $\mathbf{r}(t) = t\mathbf{i} + \sin t\mathbf{j} + \cos t\mathbf{k}$, $0 \leq t \leq \pi$.

Chapter 16 Review

6. Evaluate the line integral $\int_C \sqrt{xy} dx + e^y dy + xz dz$, where C is given by $\mathbf{r}(t) = t^4\mathbf{i} + t^2\mathbf{j} + t^3\mathbf{k}$, $0 \leq t \leq 1$.