This print-out should have 11 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

QuadApprox02a
001 10.0 points

Find the quadratic approximation to

$$f(x,\,y) \;=\; \cos(2x+y)-\sin(x-y)$$

at $P(0,\,0)$.

1. $Q(x,\,y) \;=\; 2-x+y+2x^2+2xy-\dfrac{1}{2}y^2$

2. $Q(x,\,y) \;=\; 1+x-y+2x^2-2xy+y^2$

3. $Q(x,\,y) \;=\; 2-x+y+2x^2-2xy+y^2$

4. $Q(x,\,y) \;=\; 1-x+y-2x^2-2xy-\dfrac{1}{2}y^2$

5. $Q(x,\,y) \;=\; 1+x-y-2x^2+2xy+y^2$

6. $Q(x,\,y) \;=\; 2-x+y-2x^2+2xy-\dfrac{1}{2}y^2$

CalC15g19b
002 10.0 points

Locate and classify the critical point of

$$f(x,y) \;=\; \ln(xy)+2y^2-2y-2xy+3,$$

for $x, y > 0$.

1. local minimum at $\left(1,\,\dfrac{1}{2}\right)$

2. local minimum at $\left(\dfrac{1}{2},\,1\right)$

3. local maximum at $\left(\dfrac{1}{2},\,1\right)$

4. local maximum at $\left(1,\,\dfrac{1}{2}\right)$

5. saddle-point at $\left(\dfrac{1}{2},\,1\right)$

6. saddle-point at $\left(1,\,\dfrac{1}{2}\right)$

3. $\mathbf{r}(t) = (t+2)\,\mathbf{i} - (t-4)\,\mathbf{j} - (4t^2+2t)\,\mathbf{k}$

4. $\mathbf{r}(t) = (t-2)\,\mathbf{i} + (t+4)\,\mathbf{j} - (4t^2-2t)\,\mathbf{k}$

5. $\mathbf{r}(t) = (t-2)\,\mathbf{i} + (t+4)\,\mathbf{j} - (4t^2+2t)\,\mathbf{k}$

6. $\mathbf{r}(t) = (t+2)\,\mathbf{i} + (t+4)\,\mathbf{j} - (4t^2-2t)\,\mathbf{k}$

CalC14d16s
003 10.0 points

Determine the position vector, $\mathbf{r}(t)$, of a particle having acceleration

$$\mathbf{a}(t) = -8\,\mathbf{k}$$

when its initial velocity and position are given by

$$\mathbf{v}(0) = \mathbf{i} + \mathbf{j} - 2\,\mathbf{k}, \quad \mathbf{r}(0) = 2\,\mathbf{i} + 4\,\mathbf{j}$$

respectively.

1. $\mathbf{r}(t) = (t+2)\,\mathbf{i} - (t-4)\,\mathbf{j} - (4t^2-2t)\,\mathbf{k}$

2. $\mathbf{r}(t) = (t+2)\,\mathbf{i} + (t+4)\,\mathbf{j} - (4t^2+2t)\,\mathbf{k}$

CalC14c04a
004 10.0 points

The curve C is parametrized by

$$\mathbf{c}(t) = (5-2t)\mathbf{i} + \ln(4t)\,\mathbf{j} + (3-t^2)\mathbf{k}\,.$$

Find the arc length of C between $\mathbf{c}(1)$ and $\mathbf{c}(2)$.

GradVectorField01a
005 10.0 points

If $f(x, y)$ is a potential function for the gradient vector field

$$\mathbf{F}(x, y) = (2x - y)\,\mathbf{i} - (x + 2y)\,\mathbf{j}\,,$$

evaluate

$$f(1, 2) - f(0, 1)\,.$$

Curl01a
006 10.0 points

Find the curl of the vector field

$$\mathbf{F}(x, y, z) = 2zx\,\mathbf{i} - xy\,\mathbf{j} - 3yz\,\mathbf{k}\,.$$

1. $\operatorname{curl} \mathbf{F} = 2z\,\mathbf{i} + x\,\mathbf{j} - 3y\,\mathbf{k}$

2. $\operatorname{curl} \mathbf{F} = -3z\,\mathbf{i} - 2x\,\mathbf{j} - y\,\mathbf{k}$

3. $\operatorname{curl} \mathbf{F} = -x\,\mathbf{i} + 3y\,\mathbf{j} - 2z\,\mathbf{k}$

4. $\operatorname{curl} \mathbf{F} = -3z\,\mathbf{i} + 2x\,\mathbf{j} - y\,\mathbf{k}$

5. $\operatorname{curl} \mathbf{F} = 2x\,\mathbf{i} - y\,\mathbf{j} - 3z\,\mathbf{k}$

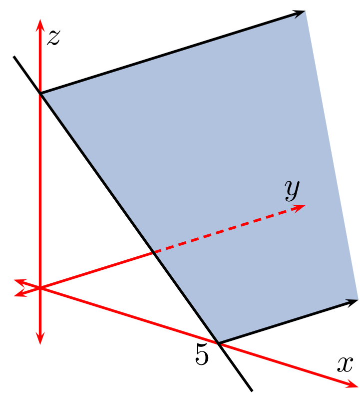
6. $\operatorname{curl} \mathbf{F} = -x\,\mathbf{i} - 3y\,\mathbf{j} + 2z\,\mathbf{k}$

CalC16b01a
007 10.0 points

The graph of the function

$$z = f(x, y) = 5 - x$$

is the plane shown in



Determine the value of the double integral

$$I = \int\int_A f(x, y)\,dxdy$$

over the region

$$A = \Big\{(x, y) : 0 \le x \le 2,\;\; 0 \le y \le 2\Big\}$$

in the xy-plane by first identifying it as the volume of a solid below the graph of f.

1. $I = 12$ cu. units

2. $I = 15$ cu. units

3. $I = 13$ cu. units

4. $I = 14$ cu. units

5. $I = 16$ cu. units

CalC16c05s
008 10.0 points

Evaluate the iterated integral

$$I = \int_0^{\pi} \int_0^{\cos(\theta)} 5\, e^{\sin(\theta)}\, dr\, d\theta\,.$$

1. $I = 5(e-1)$

2. $I = \dfrac{1}{e} - 5$

3. $I = 5e$

4. $I = e - 5$

5. $I = 5\left(\dfrac{1}{e} - 1\right)$

6. $I = 0$

CalC16g01a
009 10.0 points

Evaluate the triple integral

$$I = \int_0^1 \int_0^x \int_0^{x+y} (2x - y)\, dzdydx\,.$$

1. $I = \dfrac{11}{24}$

2. $I = \dfrac{13}{24}$

3. $I = \dfrac{5}{8}$

4. $I = \dfrac{17}{24}$

5. $I = \dfrac{3}{8}$

Div01a
010 10.0 points

Find the divergence of the vector field

$$\mathbf{F}(x,\, y,\, z) \;=\; 3x^2yz\,\mathbf{i} + 2xy^2z\,\mathbf{j} - xyz^2\,\mathbf{k}\,.$$

1. $\operatorname{div}\mathbf{F} \;=\; 7xyz$

2. $\operatorname{div}\mathbf{F} \;=\; 6xyz$

3. $\operatorname{div}\mathbf{F} \;=\; 9xyz$

4. $\operatorname{div}\mathbf{F} \;=\; 10xyz$

5. $\operatorname{div}\mathbf{F} \;=\; 8xyz$

CalC15h04exam
011 10.0 points

Determine the minimum value of

$$f(x,\, y) \;=\; 4x + 3y - 3$$

subject to the constraint

$$g(x,\, y) \;=\; x^2 + y^2 - 1 \;=\; 0\,.$$