This print-out should have 8 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering.

001 10.0 points

Evaluate the integral

$$I = \int_C (2e^y\,dx - 4ye^x\,dy)$$

when C is the parabola parametrized by

$$\mathbf{c}(t) = (t^2,\, t)\,, \quad 0 \le t \le 1\,.$$

1. $I = 6 - 2e$

2. $I = 6 + 2e$

3. $I = 3 - 2e$

4. $I = 3 + 2e$

5. $I = 3 - 4e$

6. $I = 6 - 4e$

002 10.0 points

What is the work done by the magnetic force field

$$\mathbf{B} = \mathbf{i} + x\,\mathbf{j} - 2y\,\mathbf{k}$$

in $\mathbb{R}^3$ in moving a particle from $(1,\, 1,\, 0)$ to $(e^4,\, 13,\, 4)$ along a path C parametrized by

$$\mathbf{r}(t) = e^{t^2}\,\mathbf{i} + (3t^2 + 1)\,\mathbf{j} + 2t\,\mathbf{k}?$$

1. work done $= 4e^4 - 44$

2. work done $= 2e^4 - 40$

3. work done $= 4e^4 - 46$

4. work done $= 2e^4 - 48$

5. work done $= 4e^4 - 42$

6. work done $= 2e^4 - 42$

003 10.0 points

Find the work done by the force field

$$\mathbf{F}(x,\, y) = 2x \sin \pi y\,\mathbf{i} + 3\cos \pi y\,\mathbf{j}$$

to move a particle along the parabola $y = x^2$ from $(0,\, 0)$ to $\left(\frac{1}{2},\, \frac{1}{4}\right)$.

1. Work Done $= \dfrac{1}{\pi}(\sqrt{2} - 1)$ units

2. Work Done $= (1 + \sqrt{2})$ units

3. Work Done $= \pi(\sqrt{2} - 1)$ units

4. Work Done $= (\sqrt{2} - 1)$ units

5. Work Done $= \dfrac{1}{\pi}(1 + \sqrt{2})$ units

6. Work Done $= \pi(1 + \sqrt{2})$ units

004 10.0 points

Evaluate the integral

$$I = \int_C \mathbf{F} \cdot d\mathbf{s}$$

when

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

and C is the quarter circle

$$x^2 + y^2 = 1\,, \qquad x,\, y \ge 0\,,$$

oriented clockwise.

1. $I = \dfrac{1}{4}\pi$

2. $I = -\dfrac{1}{4}\pi$

3. $I = \dfrac{1}{2}(-\pi - 3)$

4. $I = \frac{1}{4}(-\pi - 3)$

5. $I = -\frac{1}{2}\pi$

6. $I = -\frac{1}{2}(-\pi - 3)$

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005 10.0 points

Evaluate the integral

$$I = \int_C xy^4\, ds$$

when C is the right half of the circle

$$x^2 + y^2 = 1\,.$$

1. $I = \frac{2}{5}$

2. $I = \frac{1}{3}$

3. $I = \frac{2}{3}$

4. $I = 1$

5. $I = \frac{1}{5}$

6. $I = \frac{4}{5}$

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006 10.0 points

Evaluate the integral

$$I = \int_C 4x\, ds$$

when the path C is parametrized by

$$\mathbf{c}(t) = (t^2,\ 2t,\ \ln t)$$

for $1 \le t \le e$.

1. $I = e(e+1) - 4$

2. $I = 2e(e+1) + 4$

3. $I = 2e^2(e^2+1) + 4$

4. $I = 2e^2(e^2+1) - 4$

5. $I = e(e+1) + 4$

6. $I = e^2(e^2+1) - 4$

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007 10.0 points

Evaluate the integral

$$I = \int_C y\, ds$$

when C is parametrized by

$$\mathbf{c}(t) = t^2\,\mathbf{i} + t\,\mathbf{j}, \qquad 0 \le t \le \sqrt{2}\,.$$

1. $I = \frac{3}{2}$

2. $I = \frac{11}{6}$

3. $I = \frac{13}{6}$

4. $I = \frac{17}{6}$

5. $I = \frac{5}{2}$

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008 10.0 points

Find the mass of the wire formed by the intersection of the sphere

$$x^2 + y^2 + z^2 = 2$$

and the plane

$$x + y - z = 0$$

if the wire has density $3y^2/4$ grams per unit length.

1. mass $= \frac{1}{2}\sqrt{2}$ grams

2. mass $= \frac{1}{2}\sqrt{2}\,\pi$ grams

3. mass $= \sqrt{2}\,\pi$ grams

4. mass $= \frac{1}{2}\pi$ grams

5. mass $= \pi$ grams

6. mass $= \sqrt{2}$ grams