Midterm Review for Final

Sec. Ex. 25 - 10.1 Section Exercise 25	96.36%	96.36%	~~96.36%~~	
Sec. Ex. 43 - 10.4 Section Exercise 43	65.45%	65.45%	65.45%	2
Sec. Ex. 23 - 10.4 Section Exercise 23	83.64%	83.64%	83.64%	
Example 9 - 10.5 Example 9	96.36%	96.36%	96.36%	
Sec. Ex. 55 - 10.6 Section Exercise 55	90.91%	90.91%	90.91%	
Sec. Ex. 37 - Parametric Graphs	73.64%	73.64%	73.64%	6
Sec. Ex. 7 - 11.3 Section Exercise 7	80.00%	80.00%	80.00%	
Sec. Ex. 10 - 11.4 Section Exercise 10	90.91%	90.91%	90.91%	
Sec. Ex. 2 - 11.6 Section Exercise 2	63.64%	63.64%	63.64%	9
Sec. Ex. 11a - Partial Derivatives	70.00%	70.00%	70.00%	10
Sec. Ex. 31 - Graphs of Contour Lines	77.27%	77.27%	77.27%	11
Sec. Ex. 7 - Limits	99.09%	99.09%	99.09%	
Example 1 - 12.3 Example 1	93.64%	93.64%	93.64%	
Sec. Ex. 14 - Directional Derivatives	96.36%	96.36%	96.36%	
Sec. Ex. 34 - Extrema	96.36%	96.36%	96.36%	
Sec. Ex. 23 - 12.5 Section Exercise 23	89.09%	89.09%	89.09%	
Sec. Ex. 47 - Lagrange	76.36%	76.36%	76.36%	17
Sec. Ex. 11 - Integrals	83.64%	83.64%	83.64%	
Sec. Ex. 1 - Double Integrals	100.00%	100.00%	100.00%	
Sec. Ex. 8 - Vector Calculus	48.18%	48.18%	48.18%	20

Md. #2

Please round your answer to three decimals and remember answer is in radians.

Use the cross product to determine the angle between $a = 9i + 4k$ and $b = 4j + 3k$.

$$\cos\theta = \frac{a \cdot b}{|a||b|}$$

$$\theta = \cos^{-1}\left(\frac{\langle 9,0,4\rangle \cdot \langle 0,4,3\rangle}{\sqrt{81+16}\cdot\sqrt{16+9}}\right)$$

$$= \cos^{-1}\left(\frac{12}{5\sqrt{97}}\right)$$

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cos⁻¹(12/(5√97))
                1.324634719
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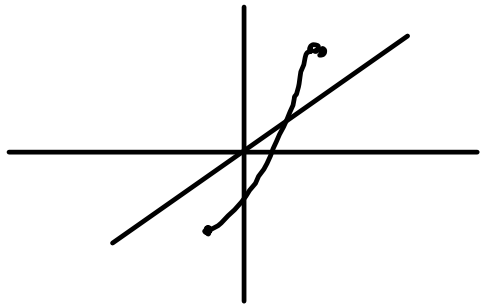
Choose the sketch of the curve and estimate its arc length.

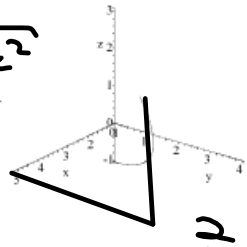
$$r(t) = \langle t^2+1, 2t, t^2-1 \rangle, 0 \le t \le 2$$



$r' = \langle 2t, 2, 2t \rangle$

$|r'| = \sqrt{4t^2+4+4t^2}$

B.



$\int_0^2 (\sqrt{8X^2+4})\,dX$

13.65685425

$$\int |r'|\,dt = \int_0^2 \sqrt{8t^2+4}\,dt$$

Find the unit tangent vector to the curve

$r(t) = \langle 5\cos t, 3\sin t \rangle$

at $t = -\pi$.

- A. $T(-\pi) = \langle 0, 0 \rangle$
- B. $T(-\pi) = \langle 5, 0 \rangle$
- C. $T(-\pi) = \langle 0, -1 \rangle$
- D. $T(-\pi) = \langle 5, 5 \rangle$

$r' = \langle -5\sin t, 3\cos t \rangle$

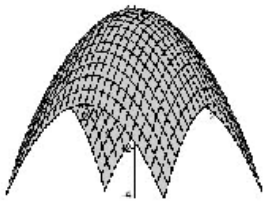
$$\frac{r'(-\pi)}{|r'(-\pi)|} = \frac{\langle 0, -3 \rangle}{3}$$

$$= \langle 0, -1 \rangle$$

9. Award: 10.00 points Problems? Adjust credit for all students.

Select the graph of the parametric surface.
$x = u, y = v, z = 4 - u^2 - v^2$

A.



z= 4 - x^2 - y ^2

10

Compute the linear approximation of the function $f(w, x, y, z) = 8w^2xy - e^{2wyz}$ at the point $(-2, 5, 2, 0)$.

$L(-2, 5, 2, 0) =$

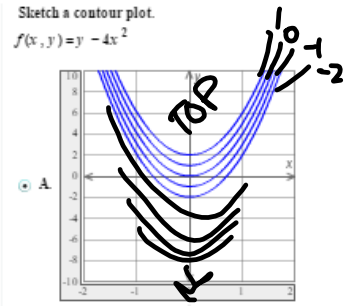
$$\frac{\partial f}{\partial w} = 16wxy - e^{2wyz} \cdot 2yz$$

$$f(-2,5,2,0) + \left(\frac{\partial f}{\partial w}\right)(w+2) + \left(\frac{\partial f}{\partial x}\right)(x-5) + \left(\frac{\partial f}{\partial y}\right)(y-2) + \left(\frac{\partial f}{\partial z}\right)z$$

#11

Sketch a contour plot.

$f(x, y) = y - 4x^2$



A.

$1 = y - 4x^2$

$y = 4x^2 + 1$

#17

Minimize $f(x, y, z) = x^2 + y^2 + z^2$, subject to the constraints $x + 2y + 3z = -15$ and $y + z = 0$.

$f(x,y,z) = x^2 + y^2 + z^2$ $\quad \nabla f = \langle 2x, 2y, 2z \rangle$

$g(x,y,z) = x + 2y + 3z + 15 = 0$ $\quad \nabla g = \langle 1, 2, 3 \rangle$

$h(x,y,z) = y + z = 0$ $\quad \nabla h = \langle 0, 1, 1 \rangle$

$y = -z$

$2x = \lambda$ $\quad \boxed{x = \lambda/2}$

$2y = 2\lambda + \mu$

$2z = 3\lambda + \mu$

$2y - 2z = \lambda$

$-2z - 2z = \lambda$

$-4z = \lambda$

$z = -\lambda/4$

$y = \lambda/4$

$x + 2y + 3z = -15$

$\frac{\lambda}{2} + \frac{2\lambda}{4} - \frac{3\lambda}{4} = -15$

$\frac{2\lambda}{4} + \frac{2\lambda}{4} - \frac{3\lambda}{4} = -15$

$\frac{\lambda}{4} = -15$

$\lambda = -15(4)$

$\lambda = -60$

$x = \frac{\lambda}{2} = -\frac{60}{2} = 30$

$y = \frac{\lambda}{4} = -\frac{60}{4} = 15$

$z = -15$

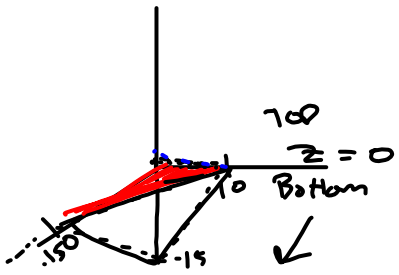
$f(x,y,z) = x^2 + y^2 + z^2$

$30^2 + 15^2 + 15^2 =$

#20

Compute the volume of the solid bounded by the given surfaces.
$x + 15y - 10z = 150$ and the three coordinate planes.

$$\iint_R \text{Top} - \text{Bottom}\ dA$$



$$z = \frac{150 - x - 15y}{-10}$$

$$x + 15y = 150$$
$$x = 150 - 15y$$

$$\int_{y=0}^{10} \int_{x=0}^{150-15y} \frac{150}{10} - \frac{x}{10} - \frac{15y}{10}\, dx\, dy$$

$$\int_0^{10} 15x - \frac{x^2}{20} - 1.5xy \Big|_0^{150-15y} dy$$

$$\int_0^{10} 15(150-15y) - \frac{(150-15y)^2}{20} - 1.5(150-15y)y\, dy$$