Homework due 11/22

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Sec. 16.4

7) $G(1,4) = (6, -15, 3)$

$T_u(1,4) = (2, 1, 3)$ $T_v(1,4) = (1, -4, 0)$

$N = T_u \times T_v = (12, 3, -9)$

tangent plane: $12(x-6) + 3(y+15) - 9(z-3) = 0$

13) $r_u = (\cos v, \sin v, 1)$ $r_v = (-u \sin v, u \cos v, 0)$

$dS = |r_u \times r_v| \, du \, dv = \sqrt{2}\, u$

$$\int_0^1 \int_0^1 u^3 \sqrt{2}\, u = \frac{\sqrt{2}}{5}$$

15) $dS = \sqrt{1 + 0(-2z)^2} \, dx \, dz$

$$\int_0^3 \int_0^3 z\sqrt{1+4z^2} \, dx \, dz = \frac{37\sqrt{37}}{4} - \frac{1}{4}$$

19) We can use cylindrical coordinates for this

$$\int_0^{2\pi} \int_0^2 \int_0^4 e^{-z} \cdot r \, dz \, dr \, d\theta = 4\pi - 4\pi e^{-4}$$

Sec. 16.5

5) $z = 1 - 3x + 4y$

$$\int_0^1 \int_0^1 \left(-y(-3) - z \cdot 4 + x\right) dx\, dy =$$

$$\int_0^1 \int_0^1 \left(3y - 4(1 - 3x + 4y) + x\right) dx\, dy = -4$$

7) $z = \sqrt{9 - x^2 - y^2}$

$$\int_0^3 \int_0^{\sqrt{9-x^2}} \left(\frac{3y}{\sqrt{9-x^2-y^2}} + x\right) dy\, dx = \frac{27\pi}{4} + 9$$

9) $z = 9 - x^2 - y^2$

$$\int_0^3 \int_0^{\sqrt{9-x^2}} \left((9 - x^2 - y^2)(2x + 2y) + x\right) dy\, dx = \frac{693}{5}$$

11) $z = 1 - x - y$

$$\int_0^1 \int_0^{1-x} \left(y^2 + 2 - x\right) dy\, dx = \frac{11}{12}$$