Math 53 Homework 12

Due **Wednesday 11/15/17** in section

(The problems in parentheses are for extra practice and optional. Only turn in the underlined problems.)

Monday 11/6: Surface integrals and flux

- **Read:** section 16.7.
- **Work:** 16.7: $\underline{16}$[1], (17), $\underline{18}$[1], (20), $\underline{23}$, $\underline{24}$[1], $\underline{26}$[1], (27), $\underline{29}$, (31), (32).
  Problem 1 below.

Wednesday 11/8: The divergence theorem

- **Read:** section 16.9.
- **Work:** 16.9: (1), $\underline{2}$[2], $\underline{3}$[2], (4), (5), $\underline{7}$, $\underline{11}$[2], (13).

Additional problems on the divergence theorem will be assigned with HW 13.

Friday 11/10: NO CLASS (Veterans' Day)

Monday 11/13: Review for Midterm 2

Wednesday 11/15: MIDTERM 2

Problem 1. (Surface area on the sphere.)

a) What percentage, rounded to the nearest percent, of the Earth's surface is north of Berkeley? The latitude here is 38°. (Latitude is related to the spherical angle ϕ by the formula: $\alpha = 90° - \phi$)

b) Find the average latitude of all points in the Southern Hemisphere.

Optional: Identify a city whose latitude is within one degree of the average.

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[1] **7th ed:** do the 8th ed problems: **# 16:** $\iint_S y^2\,dS$, S is the part of the sphere $x^2+y^2+z^2=1$ that lies above the cone $z=\sqrt{x^2+y^2}$. **# 18:** $\iint_S (x+y+z)\,dS$, S is the part of the half-cylinder $x^2+z^2=1$, $z\geq 0$, that lies between the planes $y=0$ and $y=2$. **# 24:** $\vec{F}(x,y,z) = -x\hat{\imath} - y\hat{\jmath} + z^3\hat{k}$, S is the part of the cone $z=\sqrt{x^2+y^2}$ between $z=1$ and $z=3$ with downward orientation. **# 26:** $\vec{F}(x,y,z) = y\hat{\imath} - x\hat{\jmath} + 2z\hat{k}$, S is the hemisphere $x^2+y^2+z^2=4$, $z\geq 0$, oriented downward.

[2] **7th ed:** do the 8th ed problems: **# 2:** $\vec{F}(x,y,z) = y^2z^3\hat{\imath} + 2yz\hat{\jmath} + 4z^2\hat{k}$, E is the solid enclosed by the paraboloid $z=x^2+y^2$ and the plane $z=9$. **# 3:** $\vec{F}(x,y,z)=\langle z,y,x\rangle$, E is the solid ball $x^2+y^2+z^2\leq 16$. **# 11:** $\vec{F}(x,y,z) = (2x^3+y^3)\hat{\imath} + (y^3+z^3)\hat{\jmath} + 3y^2z\hat{k}$, S is the surface of the solid bounded by the paraboloid $z=1-x^2-y^2$ and the xy-plane.