HOMEWORK 4, DUE TUESDAY, MARCH 1 (OR THURSDAY, MARCH 3?)

Please turn in solutions for the following problems:

(1) Compute each of the following contour integrals:
   (a) $\displaystyle\int_C e^z\,dz$, where C is the line segment from 0 to $1+i$
   (b) $\displaystyle\int_C \frac{1}{z+4}\,dz$, where C is the circle of radius 1 centered at -4 traversed counterclockwise
   (c) $\displaystyle\int_C z\,dz$, where C is the left semicircle from i to $-i$
   (d) $\displaystyle\int_C z\overline{z}\,dz$, where C is the line segment from $-1+i$ to $1+5i$
   (e) $\displaystyle\int_C z^3-6z^2+4\,dz$, where C is any curve joining $-1+i$ to 1

(2) Suppose $f(z)$ is the principal branch of z^i. That is, $f(z) = e^{i\,\mathrm{Log}(z)}$, for $-\pi < \mathrm{Arg}(z) < \pi$. Let C be the upper semicircle parametrized by $z(t) = e^{it}$, for $0 \le t \le \pi$. Compute the integral $\int_C f(z)\,dz$.

(3) Let C be the positively oriented boundary of the square with corners at $2+2i$, $2-2i$, $-2+2i$, and $-2-2i$. Evaluate each integral:
   (a) $\displaystyle\int_C \frac{z}{2z+1}\,dz$
   (b) $\displaystyle\int_C \frac{\cos(z)}{z(z^2+8)}\,dz$

(4) Let C be the circle $|z-i| = 2$, positively oriented. Evaluate each integral:
   (a) $\displaystyle\int_C \frac{1}{z^2+4}\,dz$
   (b) $\displaystyle\int_C \frac{1}{(z^2+4)^2}\,dz$

In addition, I suggest that you work these problems from the Brown/Churchill textbook (but do not turn in):

- Page 121, problems 2, 4
- Page 135, problems 1, 2, 4, 6
- Page 149, problems 1, 2
- Pages 160-161, problems 1, 2
- Pages 170-171, problems 1, 3, 4