MATH 249

Today

1. 16.3: FTCLI (Understand the FTCLI as a generalization of the FTC and be able to apply it.)

2. WeBWorK

16.3: FTCLI

1. Let $C : \vec{r}(t)$ on $[a, b]$ be (piecewise) smooth, and let f be a differentiable function such that ∇f is continuous on C. Then

$$\int_C \nabla f \cdot d\vec{r} = f(\vec{r}(b)) - f(\vec{r}(a)).$$

2. Notes:

   (a) Path integrals of conservative vector fields are independent of path. Only the endpoints matter!

   (b) $\oint_C \vec{F} \cdot d\vec{r} = 0$ if $\vec{F}$ is conservative.

   (c) If $\vec{F}$ is continuous on an open connected region D and $\int_C \vec{F} \cdot d\vec{r}$ is independent of path in D, then $\vec{F}$ is conservative on D.

   (d) If $\vec{F} = <P, Q>$ is conservative and P and Q have continuous partial derivatives on D, then $P_y = Q_x$ on D.

   (e) If $\vec{F} = <P, Q>$ on an open, simply connected region D, P and Q have continuous partial derivatives on D, and $P_y = Q_x$ on D, then $\vec{F}$ is conservative on D.

3. Examples p. 1053: #1, 2, 3, 6, 7, 11, 14, 16 (...), 23, 24

Next Time

1. Review.

2. Watch 16.4 [$\sim$52 minutes] for **after** exam.