9 For lecture on 10/31

1. Compute $\int_{\mathbf{c}} f\,ds$.
   (a) $f(x,y,z) = 2xy - z$, $\mathbf{c}(t) =< 2\sin t, 2\cos t, 7t >$, $0 \le t \le 2\pi$.
   (b) $f(x,y) = x^3y^{30}$, $\mathbf{c}$ is the unit circle in $\mathbb{R}^2$.
   (c) $f(x,y,z) = x + 2y - z^2$, $\mathbf{c}$ consists of the path $t\mathbf{i} + t^2\mathbf{j}$ from (0,0,0) to (1,1,0), followed by the straight line to $(1,-1,1)$.
   (d) $^*f(x,y) = x^3 + y^3$, $\mathbf{c}$ is the part of the curve $x^{2/3} + y^{2/3} = 1$ in the first quadrant.
   (e) Find $\int_C (x^5y^{18} + x^7y^{16} + 1)ds$, where C is the upper half of the unit circle $x^2 + y^2 = 9$.
2. Compute $\int_C \mathbf{F} \cdot d\mathbf{r}$.
   (a) C is the line segment from $(2,3)$ to $(0,3)$ and $\mathbf{F} = \langle x, -y\rangle$.
   (b) C is the line segment from $(5,0,2)$ to $(5,3,4)$ and $\mathbf{F} = \langle z, -y, x\rangle$.
   (c) C is the curve on $y = e^x$ from $(2,e^2)$ to $(0,1)$ and $\mathbf{F} = \langle x^2, -y\rangle$.
   (d) C is part of the circle of radius 3 centred at origin, from $(3,0)$ to $(0,3)$ and $\mathbf{F} = \langle 1, -y\rangle$.
   (e) C is part of the curve $x = \cos(y)$ from $(1,2\pi)$ to $(1,0)$ and $\mathbf{F} = \langle y, 2x\rangle$.
3. * Find $\int_C \cos(x+z)dx + 2yze^{y^2z}dy + (\cos(x+z) + y^2e^{y^2z})dz$, where C is the *Slinky* curve, given by $\vec{c}(t) = (\sin(40t), (2+\cos(40t))\sin(t), (2+\cos(40t))\cos(t))$ with $0 \le t \le \pi$.