Assignment 7

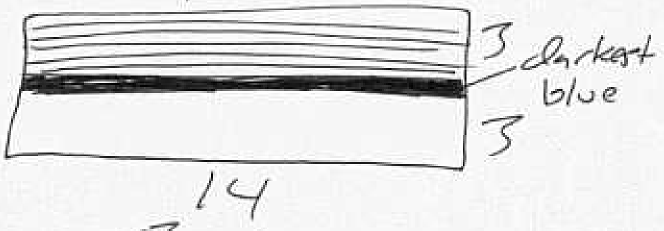
Integration Handout

13.

a) to approximate the amount of cobalt used, divide the block into n rectangles horizontally. For each rectangle, multiply the average density by the area. Then take the sum

b) $\int_0^6 \rho(x)\cdot 14\cdot dx$

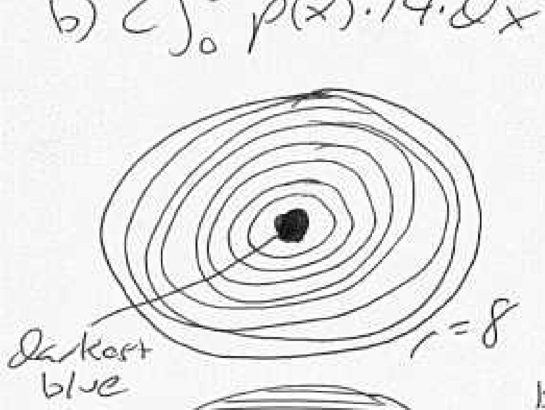
14.



a) to approximate the amount of cobalt used, divide the top half of the block into n rectangles horizontally. For each rectangle, multiply the average density by the area. Then take the sum and double it.

b) $2\int_0^3 \rho(x)\cdot 14\cdot dx$

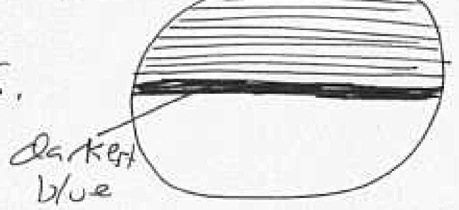
15.



a) to approximate the amount of cobalt used, slice the disc into n concentric rings. For each ring, multiply the average density by the circumference by the width. Then take the sum.

b) $\int_0^8 \rho(x)\cdot 2\pi x\cdot dx$

16.



$r=8$, $x^2+y^2=64$

$y^2=64-x^2$

$y=\pm\sqrt{64-x^2}$

So the amount of cobalt used is $2\int_0^8 \rho(x)\cdot 2\sqrt{64-x^2}\cdot d$

17.

So the amount of holes is

$$\int_0^{20} \frac{1010}{\pi(x^2+1)}\cdot 2\pi x\cdot dx =$$

$$2020\int_0^{20}\frac{x}{x^2+1}\,dx = 1010\left[\ln(x^2+1)\right]_0^{20} = 1010\ln 401$$

18. area of kth $= \alpha_k = \pi R^2 - \pi r^2 = \pi(x_{k*}+\frac{1}{2}\Delta x)^2 - \pi(x_{k*}-\frac{1}{2}\Delta x$

$= \pi(x_{k*}^2 + x_{k*}\Delta x + \frac{1}{4}\Delta x) - \pi(x_{k*}^2 - x_{k*}\Delta x + \frac{1}{4}\Delta x)$

$= 2\pi x_{k*}\Delta x$. So our approximation is valid.