The Chapter 1-4 review is fine. Look for 30-40% of the test on that.

As for Chapter 5, one problem from each of the 5 sections.

5.1 - 20 pts

5.2 - 10 pts

5.3 - 10 pts

5.4 - 20 pts (Possibly a simple force times distance thing, and then a leaky bucket or other variable-force type problem, like a chain that gets wound up.)

Newtons: kg-m/s^2

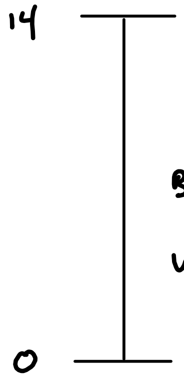
Joules: N-m = kg-m^2/s^2

5.5 - 20 pts

The rest is old stuff. Things I'm partial to:

Differential Approximations, Tangent Line Approximations, Implicit Differentiation, Fundamental Theorem of Calculus I (FTC I), Differentiate/Integrate by the Limit Definition, Formal definition of the limit.

10 kg bucket, 42 kg of water. Water leaking out (at a constant rate (i.e., LINEAR)), so it's empty at the top (dangit!), Rope is .7kg/m. Lifting the bucket 14 meters.



WORK = WORK DONE ON BUCKET + WATER + ROPE

Bucket: $(10\text{ kg})(9.8\frac{m}{s^2})(14\text{ m}) = 1372\text{ J}$

Water: TOP: $(0\text{ kg})(9.8\frac{m}{s^2}) = 0\text{ N}$

BOTTOM: $(42\text{ kg})(9.8\,m/s^2) = 411.6\text{ N}$

Force Function is a LINE!

"(x_1,y_1)" $= (y_1, F_1) = (0, 411.6)$

"(x_2,y_2)" $= (y_2, F_2) = (14, 0)$

$m = \frac{y_2-y_1}{x_2-x_1} = \frac{F_2-F_1}{y_2-y_1} = \frac{0-411.6}{14-0} = -29.4\ N/m$

$F = (-29.4\frac{N}{\cancel{m}})(y \overset{m}{-} 0) + 411.6 = \boxed{-29.4y + 411.6}$

ROPE:

$x - x_1$

$y - y_1$

$.7\frac{kg}{m}$

starts @ $(.7\,kg/m)(14\text{ m})(9.8\frac{m}{s^2}) = 96.04\text{ N}$

Ends @ 0 N

$(0, 96.04)$ $m = \frac{96.04}{-14} = -6.86\ N/m$

$(14, 0)$

$F = (-6.86\frac{N}{m})(y - 0) + 96.04 = \boxed{-6.86y + 96.04}$

(x_1, y_1), m

$y = m(x - x_1) + y_1$

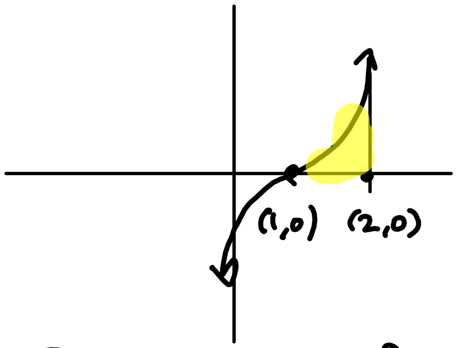
(y_1, F_1) & m $F = m(y - y_1) + F_1$

(y_2, F_2)

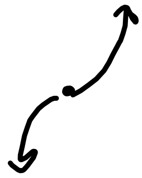
Force was constant

$$\text{WORK} = 1372\text{ J} + \int_0^{14} (-29.4y + 411.6)\,dy$$

$$+ \int_0^{14} (-6.86y + 96.04)\,dy$$



$y = (x-1)^3$



(a) Area $= \int_1^2 (x-1)^3\,dx$

$u = x-1$

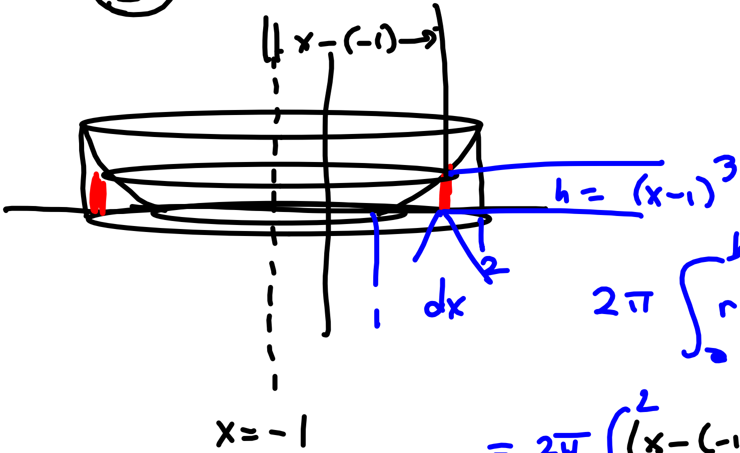
$du = dx$

$\int u^3\,du = \frac{1}{4}u^4 + C$

$= \left[\frac{1}{4}(x-1)^4\right]_1^2$

$= \frac{1}{4}(1)^4 = \boxed{\frac{1}{4}}$

(b) Rotate about $x = -1$



$2\pi \int_a^b r\,h\,dx$

$= 2\pi \int_1^2 (x-(-1))(x-1)^3\,dx$

$= 2\pi \int_1^2 (x+1)(x-1)^3\,dx$

weren't asked, but

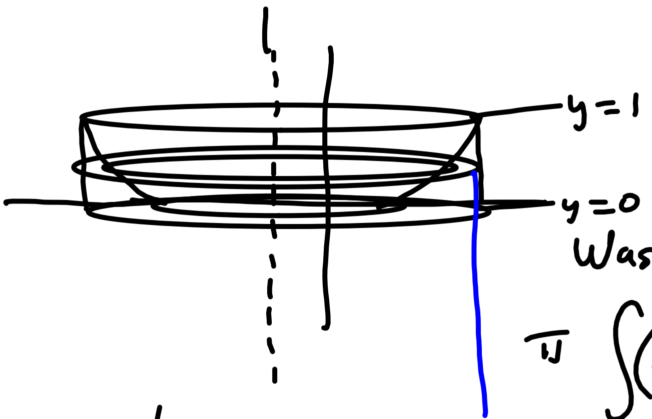
$du = dx$

$u = x-1 \rightarrow x+1 = u+2$

$$2\pi \int_{x=1}^{x=2} u^3(u+2)\,du$$

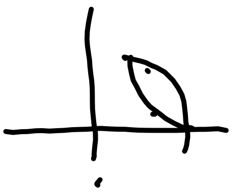
$$= 2\pi \int_{x=1}^{x=2} (u^4+2u^3)\,du$$

etc.



Washer:

$$\pi \int (\text{OUTER}^2 - \text{INNER}^2)\,dy$$



OUTER: $x=1$

INNER: $y=(x-1)^3$

$\sqrt[3]{y} = x-1$

$\sqrt[3]{y}+1 = x$

$$\pi \int_0^1 \left(1^2 - (\sqrt[3]{y}+1)^2\right)dy$$