$F'(2.25$

$r = 2$

$F(2) = 6$

$F(2.5) = 10$

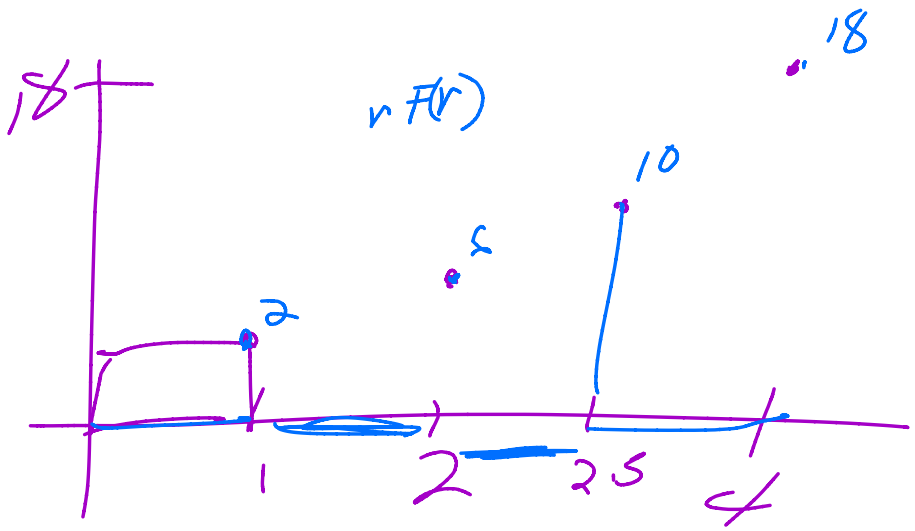
$$\frac{10\ m/cm^2 - 6\ m/cm^2}{2.5cm - 2cm}$$

$$\frac{4m}{cm^2}$$

$$\frac{.5cm}{1}$$

$$\frac{4mill}{cm^2} \cdot \frac{1}{.5cm} = \frac{8mill}{cm^2 cm}$$

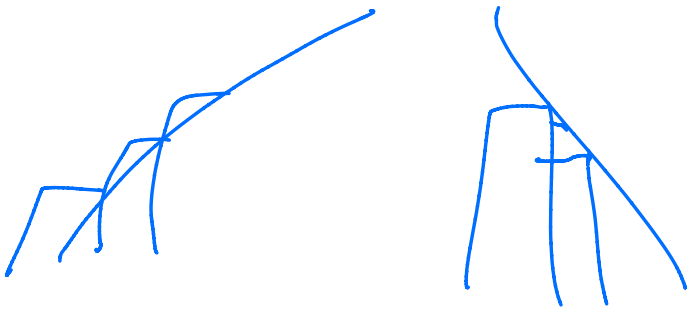
$$\frac{8mill}{cm^3}$$



$1 \cdot 1 \cdot 2$

$$2\pi \int_0^4 r\, F(r)\, dr$$

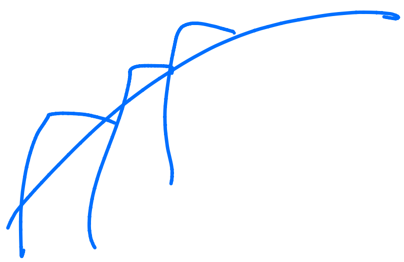
$$2\pi\left[1 \cdot 1 \cdot 2 + 1 \cdot 2 \cdot 6 + .5 \cdot (2.5)(10) + 1.5 \cdot 4 \cdot 18\right.$$

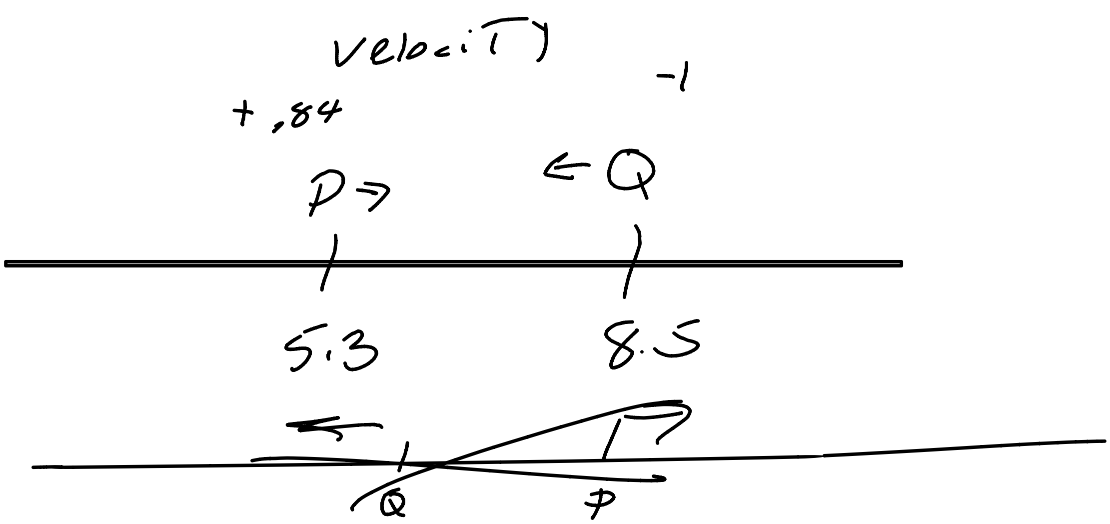


$$\frac{d}{dr}\left[r \cdot F(r)\right] = 1 \cdot F(r) + r \cdot F'(r) = +$$

+   +   + ← given

$Y = rF(r)$





$S(T)$

$S'(T) = V(T)$

$S''(T) = V'(T) = a(T)$

---

38. $F(x) = 2x^3 - 5$ $[1, 5]$

$F(1) = -3$

$F(5) = 245$

$\frac{245 - (-3)}{5 - 1}$

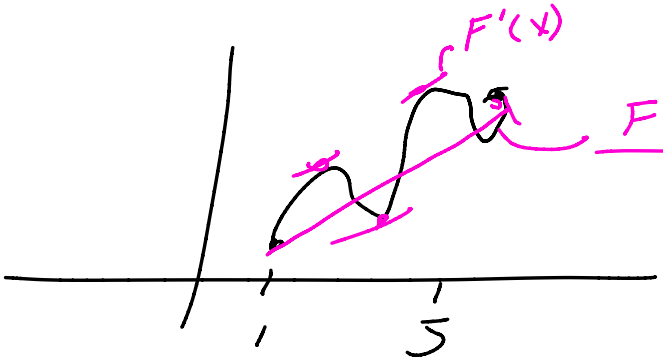
$\frac{248}{4} = 62$

$F'(x) = 6x^2 = 62$

$\frac{6x^2}{6} = \frac{62}{6}$

$x^2 = \sqrt{\frac{31}{3}} = \sqrt{10.333}$

(B) 3.215



$\frac{F(5) - F(1)}{5 - 1} = m_1$

$F'(c) = m_1$ MVT

$1 < c < 5$

39

$x+y=100$

$y=100-x$

$x, y>0$

$J = x^2 y$ max

$x^2(100-x)$

$100x^2 - x^3$ max

$200x - 3x^2 = 0$

$x \neq 0$

$\frac{200x}{x} = \frac{3x^2}{x}$

$200 = 3x$

$66.7 = \frac{200}{3} = x$

$66.7 + y = 100$

$y = 33.3$

45.

$F(x)$

$F(x) = \begin{cases} ax^4 + 5x, & x \leq 2 \\ bx^2 - 3x, & x > 2 \end{cases}$

$a(2)^4 + 5(2) = b(2)^2 - 3(2) \Rightarrow 16a + 10 = 4b - 6$

$4a(2)^3 + 5 = 2b(2) - 3 \Rightarrow 32a + 5 = 4b - 3$

$\frac{1}{2}(16) + 16 = 4b$

$8 + 16$

$24 = 4b$

$6 = b$

$16a + 16 = 4b$

$-(32a + 8 = 4b)$

$-16a + 8 = 0$

$a = \frac{1}{2}$

37. $\frac{dV}{dt} = 20\frac{in^3}{s}$ $\frac{dr}{dT} = ?$ when $r = 4$

$V = \frac{4}{3}\pi r^3$

$\frac{dv}{dT} = \frac{4}{3}\pi \cdot 3r^2 \frac{dr}{dT}$

$20 = \frac{4}{3}\pi \cdot 3(4)^2 \frac{dr}{dT}$

---

31. $y = \frac{1}{2} + \cos x$ $[0, \pi]$

$0 = \frac{1}{2} + \cos x$

$\frac{dy}{dx} = 0 + -\sin x$

$-\frac{1}{2} = \cos x$

$-\sin\frac{2\pi}{3}$

$x = \frac{2\pi}{3}$

$-\frac{\sqrt{3}}{2}$

(B)

---

33. $y = x^{\cos 4x}$ $\quad \frac{dy}{dx}$

$\ln y = \ln x^{\cos 4x}$

$\frac{d}{dx}\left[\ln y = \cos 4x \cdot \ln x\right]$

$\frac{1}{y} \cdot \frac{dy}{dx} = (-\sin 4x) \cdot 4 \cdot \ln x + \cos 4x \cdot \frac{1}{x}$

$y \cdot \frac{1}{y}\frac{dy}{dx} = \left(-4(\sin 4x)(\ln x) + \frac{\cos 4x}{x}\right) y$

$\frac{dy}{dx} = \left(-4(\sin 4x)(\ln x) + \frac{\cos 4x}{x}\right) \cdot x^{\cos 4x}$

41

$\int \sin^4(\pi x)\cos(\pi x)\, dx$

$u = \pi x$

$du = \pi dx$

$\frac{du}{\pi} = dx$

41, $\int \sin^4 u \cdot \cos u \cdot \frac{du}{\pi} = \frac{1}{\pi}\int \sin^4 u \cdot \cos u \cdot du$

$L = \sin u$

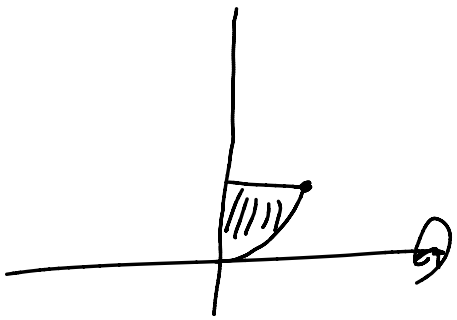
$dL = \cos u\, du$

$\frac{dL}{\cos u} = du$

$\frac{1}{\pi}\int L^4 \cancel{\cos u} \cdot \frac{dL}{\cancel{\cos u}} = \frac{1}{\pi}\cdot\frac{1}{5}L^5 + C$

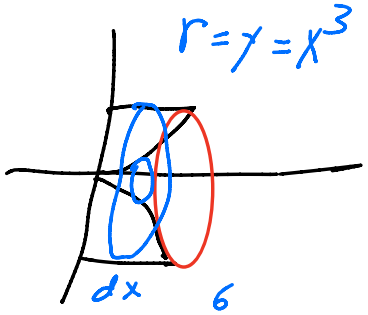
$\frac{1}{5\pi}\sin^5 \pi x + C$

36,



$R = 1$

$r = y = x^3$



$\int_0^1 \pi[1^2 - (x^3)^2]\,dx$

$\pi\left(x - \frac{1}{7}x^7\right) = 1 - \frac{1}{7} = \frac{6}{7}\cdot\pi$

42

$$\frac{dV}{dT} = 300 - T\ln T \quad \frac{m^3}{s}$$

$$\int_0^8 (300 - T\ln T)\,dT = 2349$$

+100

2449

44

$y = x \tan x$ at $x = 1$

$y = 1 \cdot \tan 1 = 1.557$

$$\frac{dy}{dx} = \tan x + x \cdot \sec^2 x$$

$\tan 1 + 1 \cdot \sec^2 1 = 4.983$

$y - 1.557 = 4.983(x - 1)$

$y = 4.983x - 4.983 + 1.557$

$y = 4.983x - 3.4$