$\lim\limits_{x\to\infty} \frac{5x^2}{e^x}$

$\lim\limits_{x\to\frac{\pi}{2}} (x-\frac{\pi}{2})\tan(x)$

$u=\frac{\pi}{2}$ as $x\to\frac{\pi}{2}=u\to 0^-$ $\lim u\tan(u+\frac{\pi}{2}) = -\cot(u)$

IDK

$\frac{d}{dx}(5x^2)=10x \to \frac{d}{dx}\frac{10x}{e^x}=\frac{10}{e^x}=0$

$e^x=e^x \to$

$y=x^2$ so $y\to 0^+$

$\lim\limits_{x\to 0^+}(x^2+1)^{\frac{1}{4x^2}} \to \lim\limits_{x\to 0^+}(1+y)^{\frac{1}{y}}=e$

$=\lim\limits_{y\to 0^+}(1+y)^{\frac{1}{4y}}$

$=\lim\limits_{y\to 0^+}[(1+y)^{\frac{1}{y}}]^{\frac{1}{4}}$

are $2e^2-3\ln e=2e^2-3$

ar1 $2(1)^2-3\ln 1=2\cdot 0=2$

$(2e^2-3)-2=2e^2-5$

$f(x)=\sec^2 x+\sin x$

$\int\sec^2(x)\,dx=\tan x+C$

$\int\sin(x)\,dx=-\cos(x)+C$

$\int_1^e 4x-\frac{3}{x}\,dx$

$\int 4x\,dx=2x^2 \to [2x^2-3\ln|x|+C]_1^e$

$\int -\frac{3}{x}\,dx=-3\ln|x|$

$\Delta x=\frac{b-a}{n}=\frac{6-(-3)}{3}=\frac{9}{3}=3$

$x=-3+3=0$ $f(0)=\frac{1}{3}(0)^2+2(0)-3=-3\cdot 3=-9 \to -9+18+63=\boxed{72}$

$x=0+3=3$ $f(3)=\frac{1}{3}(3)^2+2(3)-3=3+6-3=6\cdot 3=18$

$x=3+3=6$ $f(6)=\frac{1}{3}(6)^2+2(6)-3=12+12-3=21\cdot 3=63$

$\frac{d}{dx}\left(\int_1^{\cos(x)}\ln(t)\,dt\right)=\ln(\cos(x))\cdot\frac{d}{dx}\cos(x)$

$=-\sin(x)$

$-\sin(x)\ln(\cos(x))$

Question 10:

$A = x \cdot y$

$x + 2y = 48 - 2y$

x = Length of the side parallel to the house

y = other two sides

$= x = 48 - 2y$

$A = (48-2y)y$

$= A = 48y - 2y^2$

$\frac{dA}{dy} = 48 - 4y$

$48 - 4y = 0, +4y$

$= 4y = 48 = \boxed{y = 12}$

$x = 48 - 2(12)$

$\boxed{x = 24}$

no calculator AHH

$A = 24 \cdot 12 = 288$

$A = \boxed{288 ft}$ max

$\frac{d^2A}{dy^2} = \frac{d^2 288}{dy^2}$ = should be negative so its a concave down parabola.

Question 11:

$v(t) = t^2 - t - 6$

(b)

$t^2 - t - 6 = 0$

$= (t-3)(t+2) = 0$

$+3 \quad -2$

From $t=0$ to $t=3$

$\int_0^3 |t^2 - t - 6| dt = -\int_0^3 (t^2 - t - 6) dt$

$\int_0^3 (6 + t - t^2) dt = [6t + \frac{t^2}{2} - \frac{t^3}{3}]_0^3$

$= [18 + \frac{9}{2} - 9] - [0 + 0 - 0] = 18 + 4.5 - 9 = 13.5$

From $t=3$ to $t=4$

$\int_3^4 (t^2 - t - 6) dt$

$= [\frac{4^3}{3} - \frac{4^2}{2} - 6(4)] - [\frac{3^3}{3} - \frac{3^2}{2} - 6(3)]$

$= [\frac{64}{3} - 8 - 24] - [9 - 4.5 - 18]$

$= [\frac{32}{3}] - [-13.5] = -\frac{32}{3} + 13.5 = 4.5$

total distance $= 13.5 + 4.5 = \boxed{18 meters}$

(a)

$S = \int_0^4 v(t) dt = \int_0^4 (t^2 - t - 6) dt$

$= \frac{t^3}{3} - \frac{t^2}{2} - 6t$

0 to 4 $= S = [\frac{4^3}{3} - \frac{4^2}{2} - 6(4)] - [\frac{0^3}{3} - \frac{0^2}{2} - 6(0)]$

$= S = [\frac{64}{3} - 8 - 24]$

$S = \frac{64}{3} - \frac{32 \cdot 3}{1 \cdot 3}$

$= S = \frac{32}{3} - \frac{96}{3}$

$= S = \boxed{-\frac{32}{3} \text{ meters}}$