Final Review Solutions

I. Areas & Distances

1. (a) $\int_3^5 \tan x\, dx$ OR $\int_0^2 \tan(3+x)\, dx$

(b) $\int_{-1}^4 x^3+1\, dx$ OR $\int_0^5 (x-1)^3+1\, dx$

(c) $\int_2^6 2^x\, dx$ OR $\int_6^4 2^{2+x}\, dx$

2. (a) $\int_{-1}^1 (x-1)^2 dx,\ n=4$

$\Delta x = \frac{1-(-1)}{4}$

$= 1/2$

i	x_i	$y_i=(x_i-1)^2$
0	-1	4
1	-1/2	9/4
2	0	1
3	1/2	1/4
4	1	0

(i) Left Sum: $\frac{1}{2}\left(4+\frac{9}{4}+1+\frac{1}{4}\right)=15/4$

(ii) Right Sum: $\frac{1}{2}(9/4+1+1/4+0)=7/4$

(iii) Upper Sum: $\frac{1}{2}\left(4+\frac{9}{4}+1+\frac{1}{4}\right)=15/4$

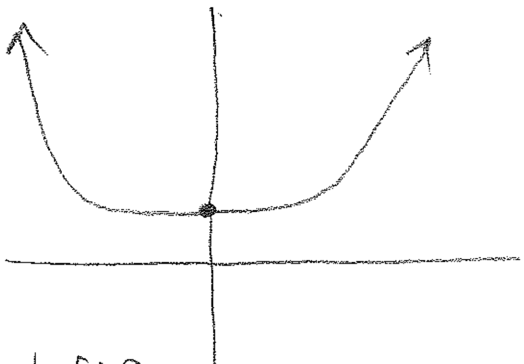
* Since f(x) is decreasing on [-1,1] this is the left sum

(iv) Trapezoid Sum: $\frac{(1/2)}{2}(4+2(9/4)+2(1)+2(1/4)+0)$

$= \frac{1}{4}(4+9/2+2+1/2)=\frac{1}{4}\left(\frac{8+9+4+1}{2}\right)=\frac{22}{8}=\boxed{\frac{11}{4}}$

(v) Simpson's: $\frac{(1/2)}{3}\left(4+4\left(\frac{9}{4}\right)+2(1)+4\left(\frac{1}{4}\right)+0\right)=\boxed{8/3}$

(b) $\int_{-1}^{1} x^4+1\,dx,\ n=5$ $\quad \Delta x = \frac{2}{5}$



i	x_i	y_i
0	-1	2
1	$-3/5$	$706/625$
2	$-1/5$	$626/625$
3	$1/5$	$626/625$
4	$3/5$	$706/625$
5	1	2

Left Sum:

(i) $\frac{2}{5}\left(2+\frac{706}{625}+\frac{626}{625}+\frac{626}{625}+\frac{706}{625}\right)=2.50496$

(ii) Right Sum:

$\frac{2}{5}\left(\frac{706}{625}+\frac{626}{625}+\frac{626}{625}+\frac{706}{625}+2\right)=2.50496$

(iii) Upper Sum: $\frac{2}{5}\left(2+\frac{706}{625}+\frac{626}{625}+\frac{706}{625}+2\right)=2.90432$

decreasing to $x=0$
increasing after $x=0$

(iv) Trapezoid: $\frac{2/5}{2}\left(2+2\left(\frac{706}{625}\right)+2\left(\frac{626}{625}\right)+2\left(\frac{626}{625}\right)+2\left(\frac{706}{625}\right)+2\right)\approx 2.50496$

(v) Simpson's: Trick question. n needs to be even!

(c) $\int_{0}^{\pi/2} \cos x\,dx,\ n=3$ $\quad \Delta x = \pi/6$

i	x_i	y_i
0	0	1
1	$\pi/6$	$\sqrt{3}/2$
2	$\pi/3$	$1/2$
3	$\pi/2$	0

(i) Left: $\frac{\pi}{6}\left(1+\frac{\sqrt{3}}{2}+\frac{1}{2}\right)$

(ii) Right: $\frac{\pi}{6}\left(\frac{\sqrt{3}}{2}+\frac{1}{2}+0\right)$

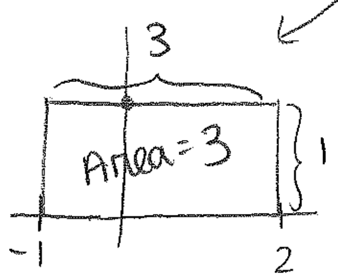
(iii) Upper: $\frac{\pi}{6}\left(1+\frac{\sqrt{3}}{2}+\frac{1}{2}\right)$

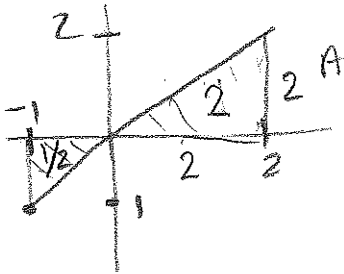
(iv) Trapezoid: $\frac{\pi/6}{2}\left(1+2\left(\frac{\sqrt{3}}{2}\right)+2\left(\frac{1}{2}\right)+0\right)$

(v) Simpson's: Again, n needs to be even to do this

2. The Definite Integral

1. (a) $\int_{-1}^{2} 1-2x\,dx = \int_{-1}^{2} 1 - 2\int_{-1}^{2} x\,dx = 3-2(3/2) = \boxed{0}$

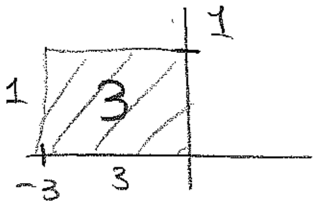


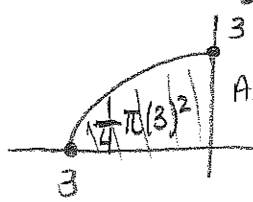


Area $= 2 - 1/2 = 3/2$

(b) $\int_{-3}^{0} 1+3\sqrt{9-x^2}\,dx = \int_{-3}^{0} 1\,dx + 3\int_{-3}^{0}\sqrt{9-x^2}\,dx = 3+3\left(\frac{9\pi}{4}\right)$

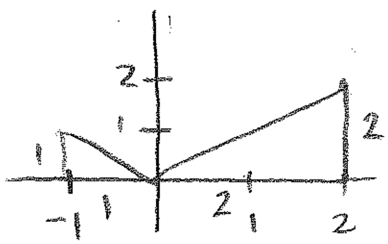
$= \boxed{3+\frac{18\pi}{4}}$





Area $= \frac{9\pi}{4}$

(c) $\int_{-1}^{2} |x|\,dx = \int_{-1}^{0} -x\,dx + \int_{0}^{2} x\,dx = \frac{1}{2}(1) + \frac{1}{2}(2\cdot 2) = \frac{1}{2}+2 = \boxed{\frac{5}{2}}$



(d) $\int_{-4}^{4} \tan x + \sin x - 4\csc x\,dx = 0$

tan x, sin x, csc x are all
odd functions!

2. (a) $\int_{-3}^{4} 3x^7+2x^3\,dx + \int_3^4 \sec x\,dx$

$$= \underbrace{\int_{-3}^{3} 3x^7+2x^3\,dx}_{0} + \int_3^4 3x^7+2x^3\,dx + \int_3^4 \sec x\,dx$$

b/c $3x^7+2x^3$ is an odd function

$$= \boxed{\int_3^4 3x^7+2x^3+\sec x\,dx}$$

(b) $\int_{-2}^{2} f(x)\,dx + \int_2^5 f(x)\,dx - \int_{-2}^{-1} f(x)\,dx$

$$= \int_{-2}^{5} f(x)dx - \int_{-2}^{-1} f(x)dx = \boxed{\int_{-1}^{5} f(x)\,dx}$$

3. $\int_0^{2\pi} f(x)dx = 4$

(a) $\int_0^{2\pi} 3f(x)+2\,dx = 3\int_0^{2\pi} f(x) + \int_0^{2\pi} 2\,dx$

$$= 3(4) + 2(2\pi) = \boxed{12+4\pi}$$

(b) $\int_0^{2\pi}\left(\frac{2f(x)}{3}+5\right)dx = \frac{2}{3}\int_0^{2\pi} f(x)dx + \int_0^{2\pi} 5\,dx$

$$= \frac{2}{3}(4) + 5(2\pi - 0)$$

$$= \boxed{\frac{8}{3}+10\pi}$$

3. The Fundamental Thm of Calculus

(2) (a) $\dfrac{d}{dx}\displaystyle\int_1^x \frac{1}{t^3+1}\,dt = \frac{1}{x^3+1}$

(b) $\dfrac{d}{ds}\displaystyle\int_5^s (t-t^2)^8\,dt = (s-s^2)^8$

(c) $\dfrac{d}{dx}\cos x \displaystyle\int_x^{\pi} \sqrt{1+\sec t}\,dt = \frac{d}{dx}\cos x \cdot -\int_{\pi}^{x} \sqrt{1+\sec t}\,dt$

$= (-\sin x)\cdot -\displaystyle\int_{\pi}^{x} \sqrt{1+\sec t}\,dt + (\cos x)(-\sqrt{1+\sec x})$

(d) $\dfrac{d}{dx}\displaystyle\int_{x^3+x}^{1} \cos\sqrt{t}\,dt = -\frac{d}{dx}\int_1^{x^3+x} \cos\sqrt{t}\,dt$

$= -\cos\sqrt{x^3+x}\cdot(3x^2+1)$

(3) On what interval is $y=\displaystyle\int_0^x \frac{t^2}{t^2+t+2}\,dt$ concave downward?

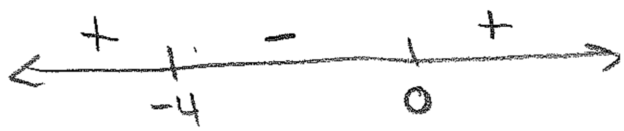
$\dfrac{d}{dx}y = \dfrac{x^2}{x^2+x+2}$

$\dfrac{d^2}{dx^2}y = \dfrac{2x(x^2+x+2)-x^2(2x+1)}{(x^2+x+2)^2} = \dfrac{2x^3+2x^2+4x-2x^3-x^2}{(x^2+x+2)^2}$

$= \dfrac{x^2+4x}{(x^2+x+2)^2}$

$\dfrac{x^2+4x}{(x^2+x+2)^2} = 0$ when $x^2+4x=0$

$\Rightarrow x=0$ OR $x=-4$



Concave downward on $(-4,0)$

4. Indefinite Integrals

1. (a) $\int x^4 - \frac{1}{2}x^3 + \frac{1}{4}x - 2 \, dx = \frac{x^5}{5} - \frac{x^4}{8} + \frac{x^2}{8} - 2x + C$

(b) $\int (u+4)(2u+1)du = \int 2u^2 + 9u + 4 \, du$

$= \frac{2}{3}u^3 + \frac{9}{2}u^2 + 4u + C$

(c) $\int \theta - \csc\theta \cot\theta \, d\theta = \frac{\theta^2}{2} + \csc\theta + C$

2. (a) $\int_1^2 \frac{v^3 + 3v^6}{v^4} dv = \int_1^2 \frac{1}{v} + 3v^2 dv$

$= \ln v + v^3 \Big|_1^2 = \ln 2 + 8 - 0 - 1$

$= \boxed{\ln 2 + 7}$

(b) $\int_0^1 x^e + e^x dx = \frac{x^{e+1}}{e+1} + e^x \Big|_0^1 = \frac{1^{e+1}}{e+1} + e^1 - \frac{0^{e+1}}{e+1} + e^0$

$= \boxed{\frac{1}{e+1} + e + 1}$

(c) $\int_0^{\pi} f(x) dx$

$= \int_0^{\pi/2} \sin x \, dx + \int_{\pi/2}^{\pi} \cos x$

$= -\cos x \Big|_0^{\pi/2} + \sin x \Big|_{\pi/2}^{\pi}$

$= -\cos \pi/2 + \cos 0 + \sin \pi - \sin \pi/2$

$= 0 + 1 + 0 - 1 = 0$

3. (a) $\int_{-2}^{3} (x^2-3)\,dx = \frac{x^3}{3} - 3x \Big|_{-2}^{3} = \frac{27}{3} - 3\cdot 3 - \frac{(-2)^3}{3} + 3(-2)$

$= 9 - 9 + \frac{8}{3} - 6 = \boxed{\frac{-10}{3}}$

(b) $\int_0^2 (2x-3)(4x^2+1)\,dx = \int_0^2 8x^3 + 2x - 12x^2 - 3\,dx$

$= 2x^4 + x^2 - 4x^3 - 3x \Big|_0^2$

$= 2(16) + 4 - 4(8) - 6 = 32 + 4 - 32 - 6 = \boxed{-2}$

(c) $\int_1^2 \left(\frac{x}{2} - \frac{2}{x}\right)dx = \frac{x^2}{4} - 2\ln x \Big|_1^2 = \frac{4}{4} - 2\ln 2 - \frac{1^2}{4} + 2\ln 1$

$= 1 - 2\ln 2 - \frac{1}{4}$

$= \boxed{\frac{3}{4} - 2\ln 2}$

(d) $\int_0^1 x^{10} + 10^x\,dx = \left(\frac{x^{11}}{11} + \frac{10^x}{\ln 10}\right)\Big|_0^1 = \frac{1}{11} + \frac{10}{\ln 10} - \frac{1}{\ln 10}$

$= \boxed{\frac{1}{11} + \frac{9}{\ln 10}}$

(e) $\int_0^{\pi/3} \frac{\sin\theta + \sin\theta\tan^2\theta}{\sec^2\theta}\,d\theta = \int_0^{\pi/3} \frac{\sin\theta}{\sec^2\theta} + \frac{\sin\theta\tan^2\theta}{\sec^2\theta}\,d\theta$

$= \int_0^{\pi/3} \cos^2\theta\cdot\sin\theta + \sin^3\theta\,d\theta$

$= \int_0^{\pi/3} \sin\theta(\cos^2\theta + \sin^2\theta)\,d\theta$

$= \sin\theta \Big|_0^{\pi/3} = \boxed{\frac{\sqrt{3}}{2}}$

5. The Substitution Rule

(a) $\int e^{7x}\,dx$ yes sub: $u = 7x$, $du = 7\,dx \Rightarrow \frac{du}{7} = dx$

$= \int e^u \frac{du}{7} = \frac{e^u}{7} + C = \boxed{\frac{e^{7x}}{7} + C}$

(b) $\int 8x^3 + 3x^2\,dx = \boxed{2x^4 + x^3 + C}$ No sub

(c) $\int \cos(x/2)\,dx$ yes sub: $u = x/2$, $du = \frac{1}{2}dx \Rightarrow 2\,du = dx$

$= \int 2\cos u\,du = 2\sin u + C = \boxed{2\sin\left(\frac{x}{2}\right) + C}$

(d) $\int e^{x^2} x\,dx$ yes sub: $u = x^2$, $du = 2x\,dx \Rightarrow \frac{du}{2} = x\,dx$

$= \int e^u \frac{du}{2} = \frac{e^u}{2} + C = \boxed{\frac{e^{x^2}}{2} + C}$

(e) $\int y(y^2+1)^2\,dy =$ yes sub: $u = y^2+1$, $du = 2y\,dy$, $\frac{du}{2} = y\,dy$

$= \int u^2 \frac{du}{2} = \frac{u^3}{6} + C = \boxed{\frac{(y^2+1)^3}{6} + C}$

(f) $\int_0^1 x\sqrt{1-x^2}\,dx$ $u = 1-x^2$ $du = -2x\,dx \Rightarrow \frac{du}{-2} = x\,dx$

$= \int_{1-0^2}^{1-1^2} \sqrt{u}\cdot\left(-\frac{du}{2}\right) = \int_1^0 -\frac{\sqrt{u}}{2}\,du = \frac{-u^{3/2}}{3}\Big|_1^0 = \boxed{\frac{1}{3}}$

(g) $\int_1^e \frac{\ln x}{x}\,dx$ yes sub: $u = \ln x$ $du = \frac{1}{x}dx$

$$= \int_{\ln 1}^{\ln e} u\,du = \int_0^1 u\,du = \frac{u^2}{2}\Big|_0^1 = \boxed{\frac{1}{2}}$$

(h) $\int_1^3 \left(\frac{1-x}{x}\right)^2 dx = \int_1^3 \frac{1-2x-x^2}{x^2}\,dx = \int_1^3 \frac{1}{x^2} - \frac{2}{x} - 1\,dx$ No sub

$$= \frac{-1}{x} - 2\ln x - x \Big|_1^3$$

$$= -\frac{1}{3} - 2\ln 3 - 3 + 1 + 2\cdot 0 + 1$$

$$= \boxed{-4/3 - 2\ln 3}$$

(i) $\int_{-1}^2 \frac{x}{1+x^2}\,dx$ yes sub: $u = 1+x^2$ $du = 2x\,dx \Rightarrow \frac{du}{2} = x\,dx$

$$= \int_{1+(-1)^2}^{1+(2)^2} \frac{1}{u} \cdot \frac{du}{2} = \frac{1}{2}\ln u \Big|_2^5 = \boxed{\frac{1}{2}\ln 5 - \frac{1}{2}\ln 2}$$

(j) $\int_0^{\pi/6} \cos^3(2x)\sin(2x)\,dx$ yes sub: $u = \cos(2x)$ $du = -\sin(2x)\cdot 2\,dx$

$-\frac{du}{2} = \sin(2x)dx$

$$= \int_{\cos(2\cdot 0)}^{\cos(2\cdot\frac{\pi}{6})} u^3 \cdot -\frac{du}{2} = \int_1^{1/2} -\frac{u^3}{2}\,du = -\frac{u^4}{8}\Big|_1^{1/2} = \frac{-(1/2)^4}{8} + \frac{1}{8}$$

$$= \boxed{-\frac{1}{128} + \frac{1}{8}} = -\frac{4}{512} + \frac{64}{512}$$

$$= \frac{60}{512} = \frac{30}{256}$$

$$= \boxed{\frac{15}{128}}$$

(k) $\int_{-1}^2 (x+2)^2\,dx$ Either way

$u = x+2$, $du = dx$

$$= \int_1^4 u^2\,du = \frac{u^3}{3}\Big|_1^4 = \frac{64}{3} - \frac{1}{3} = \frac{63}{3} = \boxed{21}$$

(l) $\int_0^2 \frac{e^x}{1+e^x}\,dx$ yes sub: $u=1+e^x$, $du=e^x dx$

$\int_{1+e^0}^{1+e^2} \frac{1}{u}\,du = \ln u \Big|_2^{1+e^2} = \boxed{\ln(1+e^2)-\ln 2}$

(m) $\int_0^{\pi} \frac{\sec(3x)\tan(3x)}{\cos(3x)}\,dx = \int_0^{\pi} \frac{\sin(3x)}{\cos^4(3x)}\,dx$ yes u-sub: $u=\cos(3x)$, $du=-3\sin(3x)dx$, $\frac{du}{-3}=\sin(3x)dx$

$= \int_{\cos(3\cdot 0)}^{\cos(3\pi)} \frac{1}{u^4}\cdot\frac{du}{-3}$

$= \int_1^{-1} -3\left(\frac{1}{u^4}\right)du = \frac{1}{u^3}\Big|_1^{-1} = \boxed{-2}$

(n) $\int_3^4 (3-x)^{10}\,dx$ yes u-sub: $u=3-x$, $du=-dx$

$\int_{3-3}^{3-4} -u^{10}du = \frac{-u^{11}}{11}\Big|_0^{-1} = \boxed{\frac{1}{11}}$

6. Areas Between Curves

(a) $y=e^x$, $y=x^2-1$, $x=-1$, $x=1$

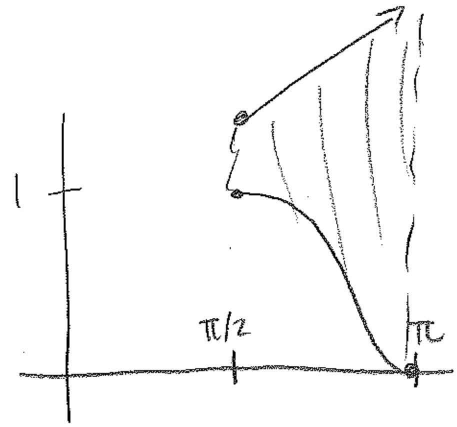
Intersection pts: None, e^x pos between $[-1,1]$ and x^2-1 neg between $[-1,1]$

Area $= \int_{-1}^{1} e^x-x^2+1\,dx = e^x-\frac{x^3}{3}+x\Big|_{-1}^{1} = e-\frac{1}{3}+1-\frac{1}{e}-\frac{1}{3}+1$

$= \boxed{e-\frac{1}{e}+\frac{4}{3}}$

(b) $y = \sin x$, $y = x$, $x = \pi/2$, $x = \pi$

No intersection points



$$\int_{\pi/2}^{\pi} x - \sin x \, dx = \frac{x^2}{2} + \cos x \Big|_{\pi/2}^{\pi}$$

$$= \frac{\pi^2}{2} - 1 - \frac{\pi^2}{8} = \boxed{\frac{3\pi^2 - 8}{8}}$$

(c) $y = 1/x$, $y = 1/x^2$, $x = 2$

Intersection points: $\frac{1}{x} = \frac{1}{x^2}$

Not in the domain

$$x^2 = x \Rightarrow x^2 - x = 0 \Rightarrow x = 0, \; x = 1$$

1/x top

1 2

$$\text{Area} = \int_1^2 \frac{1}{x} - \frac{1}{x^2} \, dx$$

$$= \ln x + \frac{1}{x} \Big|_1^2 = \ln 2 + \frac{1}{2} - 1 = \boxed{\ln 2 - \frac{1}{2}}$$

(d) $x = 2y^2$, $x = 4 + y^2$

Intersection Points:

$$2y^2 = 4 + y^2$$

$$y^2 - 4 = 0 \Rightarrow (y+2)(y-2) = 0 \Rightarrow y = -2, 2$$

$4 + y^2$ on top

−2 2

$$\int_{-2}^{2} 4 + y^2 - 2y^2 \, dy = \int_{-2}^{2} 4 - y^2 \, dy = 4y - \frac{y^3}{3} \Big|_{-2}^{2} = 8 - \frac{8}{3} + 8 - \frac{8}{3}$$

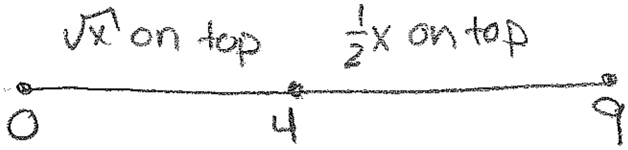
$$= \frac{48 - 16}{3} = \boxed{\frac{32}{3}}$$

(e) $y=\sqrt{x}$, $y=\frac{1}{2}x$, $x=9$

Intersection Points: $\sqrt{x}=\frac{1}{2}x$

$$x=\frac{x^2}{4}$$

$$x^2-4x=0 \Rightarrow x=0,4$$



$$\int_0^4 \sqrt{x}-\frac{1}{2}x\,dx+\int_4^9 \frac{1}{2}x-\sqrt{x}\,dx$$

$$=\left(\frac{2}{3}x^{3/2}-\frac{x^2}{4}\right)\Big|_0^4+\left(\frac{x^2}{4}-\frac{2}{3}x^{3/2}\right)\Big|_4^9$$

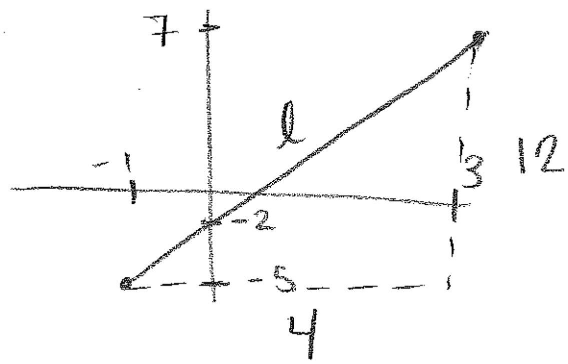
$$=\frac{16}{3}-4+\frac{81}{4}-18-4+\frac{16}{3}=\boxed{\frac{59}{12}}$$

7. Arc Length

1. $f(x)=3x-2$
   $f'(x)=3$

Arc Length $=\int_{-1}^{3}\sqrt{1+3^2}\,dx$

$$=\sqrt{10}\,x\Big|_{-1}^{3}=\sqrt{10}(3+1)=4\sqrt{10}$$



$$\ell=\sqrt{4^2+12^2}$$
$$=\sqrt{16+144}$$
$$=\sqrt{160}$$
$$=\sqrt{2^5\cdot 5}=4\sqrt{10}$$

2. $y = 2 + 2x^{3/2}$ $\quad y' = 3\sqrt{x}$

$$\text{Arc Length} = \int_0^1 \sqrt{1+(3\sqrt{x})^2}\,dx = \int_0^1 \sqrt{1+9x}\,dx$$

$$= \frac{1}{9}\cdot\frac{2}{3}(1+9x)^{3/2}\Big|_0^1$$

$$= \frac{2}{27}(10)^{3/2} - \frac{2}{27} \approx \boxed{2.26835}$$

3. $y^2 = 2(x+3)^3$

$\Rightarrow y = \pm\sqrt{2}\,(x+3)^{3/2}$ Only need positive in this problem.

$y' = \sqrt{2}\cdot\frac{3}{2}(x+3)^{1/2}$

$$\text{Arc Length} = \int_0^2 \sqrt{1+\left(\sqrt{2}\cdot\frac{3}{2}(x+3)^{1/2}\right)^2} = \int_0^2 \sqrt{1+\frac{9}{2}(x+3)}\,dx$$

$$= \int_0^2 \sqrt{\frac{29}{2}+\frac{9}{2}x}\,dx$$

$$= \frac{2}{9}\cdot\frac{2}{3}\left(\frac{29}{2}+\frac{9}{2}x\right)^{3/2}\Big|_0^2$$

$$= \frac{4}{27}\left(\frac{29}{2}+\frac{9}{2}x\right)^{3/2}\Big|_0^2$$

$$= \frac{4}{27}\left(\frac{29}{2}+9\right)^{3/2} - \frac{4}{27}\left(\frac{29}{2}\right)^{3/2} \approx \boxed{8.6972}$$

4. $f(x) = \tan(\ln x)$

$f'(x) = \sec^2(\ln x)\cdot\frac{1}{x} = \frac{\sec^2(\ln x)}{x}$

$$\boxed{\text{Arc Length} = \int_0^{\pi/4} \sqrt{1+\left(\frac{\sec^2(\ln x)}{x}\right)^2}\,dx}$$

8. Inverse Trig Functions

1. (a) $\arcsin(\pi/2)$ DNE! $\pi/2 > 1$ so not in domain.

(b) $\arccos(\cos(11\pi/3))$
$= \arccos(\sqrt{3}/2) = \boxed{\pi/3}$

(c) $\arctan(\sin(-\pi/2)) = \arctan(-1) = \boxed{-\pi/4}$

(d) $\arcsin(14\pi/3)$ DNE! $14\pi/3 > 1$

(e) $\arctan(\tan(3\pi/4)) = \arctan(-1) = \boxed{-\pi/4}$

2. (a) $f'(x) = \dfrac{2}{\sqrt{1-(2x+3)^2}}$

(b) $g'(x) = \dfrac{\arctan(2x)}{\sqrt{1-(2x+3)^2}} + \dfrac{2\arcsin x}{1+4x^2}$

(c) $h'(x) = \dfrac{\frac{e^x}{\sqrt{1-e^{2x}}} \cdot x - \arcsin(e^x)}{x^2}$

3. (a) $\displaystyle\int_0^{\sqrt{2}/2} \frac{1}{\sqrt{3-x^2}}\,dx = \arcsin\left(\frac{x}{\sqrt{3}}\right)\Big|_0^{\sqrt{2}/2}$

$= \arcsin\left(\frac{\sqrt{2}}{2\sqrt{3}}\right) - \underbrace{\arcsin(0)}_{0}$

$\approx .4205$

(b) $\displaystyle\int_5^{5\sqrt{3}} \frac{5}{25+x^2}\,dx = \arctan\left(\frac{x}{5}\right)\Big|_5^{5\sqrt{3}} = \arctan(\sqrt{3}) - \arctan 1$

$= \frac{\pi}{3} - \frac{\pi}{4} = \boxed{\frac{\pi}{12}}$

(c) $\int \frac{2x}{\sqrt{1-x^2}}\,dx$ don't use arcsine!

$u = 1-x^2 \quad du = -2x\,dx$

$= \int -\frac{du}{\sqrt{u}}$

$= -2\sqrt{u} + C = \boxed{-2\sqrt{1-x^2} + C}$