$\boxed{16.2}$

$F = \langle y^2, x^2 \rangle$ $C: y = x^{-1}$ $1 \le x \le 2$

$y = x^{-1} \rightarrow \langle \cancel{x}^{-2}, x^2 \rangle \rightarrow F(r(t)) = \langle t^{-2}, t^2 \rangle$ $r'(t) = \langle 1, -t^2 \rangle dt$

$\langle t^{-2}, t \rangle \cdot \langle 1, -t^2 \rangle = (t^{-1} - 1) \rightarrow \int_1^2 (t^{-1} - 1) dt = \boxed{-\frac{1}{2}}$

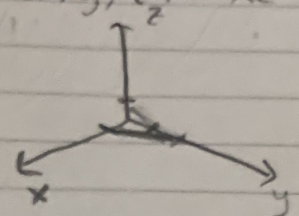
$(x,y) = \sqrt{1 + 9xy}$, $y = x^3$ $0 \le x \le 1$

parametrize the function and take integral for $0 \rightarrow 1 = \boxed{2.8}$

HW 16.2-16.3 | due 11/15/20

11. $f(x,y,z)=z^2$, $r(t)=(2t,3t,4t)$ for $0\le t\le 2$
$f(r(t))=16t^2 \rightarrow f(r(t))\cdot r'(t)$
$\int_0^2 f(r(t))\cdot r'(t)\,dt = \boxed{229.8}$

13. $f(x,y,z)=xe^{z^2}$



attempted, unsure how to depict piecewise, very confused

Parametrize and solve by taking the integral for the bound found from the piecewise

7. $\int_C 1\,ds$ $\quad r(t)=(4t,-3t,12t)$ the distance between
$\int_2^5 f(r(t))\cdot r'(t)\,dt \rightarrow \boxed{39}$ $(8,-6,24)$ and $(20,-15,60)$

7. $\int_C y\,dx - x\,dy$ parabola $y=x^2$ $0\le x\le 2$
$\int_C y\,dx - x\,dy = \int y\,dx - \int x\,dy = \boxed{-\frac{8}{3}}$

. $\int_C (x-y)\,dx+(y-z)\,dy+y\,dz$ $(0,0,0)\rightarrow(1,4,4)$
$\int(x-y)\,dx + \int(y-z)\,dy + \int y\,dz$
$(1-t)\langle 0,0,0\rangle + t\langle 1,4,4\rangle = \langle t,4t,4t\rangle$ $0\le t\le 1$
Sub t values for corresponding variable $\boxed{13/2}$

$\int_C \frac{-y\,dx+x\,dy}{x^2+y^2}$ $(1,0)$ to $(0,1)$
$\int \frac{-y\,dx}{x^2+y^2} + \int \frac{x\,dy}{x^2+y^2}$ $\quad (1-t)\langle 1,0\rangle + (t)\langle 0,1\rangle = \langle 1-t,t\rangle$
Sub t values for corresponding variables

$F(x,y,z)=\langle e^z, e^{x-y}, e^y\rangle$ $(0,0,0)$ to $(-1,1,1)$
$(1-t)\langle 0,0,0\rangle + t\langle -1,1,1\rangle = \langle -t,t,t\rangle$ $0\le t\le 1$
$F(r(t))=\langle e^t, e^{-2t}, e^t\rangle$ $\quad r'(t)=\langle e^t,-2e^{-2t},e^t\rangle$
$\int_C F(r(t))\cdot r'(t)\,dt = \boxed{2-e-\frac{1}{e}}$

HW 16.2 - 16.3 due 11/15/20

16.3

1. $f(x,y,z) = xy\sin(yz)$ $(0,0,0)$ to $(1,1,\pi) = \langle t, t, \pi t\rangle$ $0 \le t \le 1$
Plug in for x y and z to get $\boxed{0}$

3. $\nabla f = \langle 3, 6y\rangle = F(x,y)$ $r(t) = \langle t, 2t^{-1}\rangle$ $1 \le t \le 4$
$\int_1^4 F(r(t)) \cdot r'(t)\,dt$
$\int_1^4 12t^{-1} \cdot \langle 1, -2t^{-2}\rangle dt = \boxed{-\frac{9}{4}}$

5. $\nabla f = \langle ye^z, xe^z, xye^z\rangle = F(x,y)$ $r(t) = \langle t^2, t^3, t-1\rangle$ $1 \le t \le 2$
$\int_1^2 F(r(t)) \cdot r'(t)\,dt$
$\int_1^2 \langle t^3e^{t-1}, t^2e^{t-1}, t^5e^{t-1}\rangle \cdot \langle 2t, 3t^2, 1\rangle dt$ $\boxed{32e-1}$

9. $F = \langle y^2, 2xy+e^z, ye^z\rangle$
check for curl F to determine if field is conservative
$f(x,y,z) = \int y^2\,dx = xy^2 + g(y,z)$
$\frac{\partial f}{\partial y} = 2xy + e^z + g_y(y,z) = 2xy + e^z$
$f(x,y,z) = xy^2 + h(z) = \boxed{xy^2 + ye^z}$

13. $F = \langle z\sec^2 x, z, y + \tan x\rangle$
$f(x,y,z) = \int z\sec^2 x\,dx = z\tan x + g(y,z)$
$\frac{\partial f}{\partial y} = z + g_y(y,z) = z$
$f(x,y,z) = \boxed{z\tan x + zy}$

15. $F = \langle 2xy+5, x^2-4z, -4y\rangle$
$f(x,y,z) = \int 2xy + 5\,dx = x^2y + 5x + g(y,z)$
$\frac{\partial f}{\partial y} = x^2 - 4z + g_y(y,z) = x^2 - 4z$
$f(x,y,z) = \boxed{x^2y + 5x - 4yz}$

7. $\int_C 2xyz\,dx + x^2z\,dy + x^2y\,dz$ $C: 4x^2 + 9y^2 = 36$
$\int_C 2xyz\,dx + x^2z\,dy + x^2y\,dz = \int 2xyz\,dx + \int x^2z\,dy + \int x^2y\,dz$
Use C to find the parametrization of function

HW 16.2 - 16.3 due 11/15/20

19. $f = x^2y - z$ $r_1 = \langle t, t, 0 \rangle$ $r_2 = \langle t, t^2, 0 \rangle$

$f(r_2) - f(r_1)$

$t^4 - t^3 = t = \boxed{1}$