1. [16 points] Use the table to compute the following integrals. Write your answer using exact form on the blank provided. If there is not enough information available to answer the question, write N.I. You need to evaluate all integrals, but you do not need to simplify your final answer.

x	1	1	2	3	π	4	8	9
$f(x)$	0	2	5	9	-3	π	6	4
$f'(x)$	-7	-3	4	7	2	1	0	-5
$g(x)$	5	3	-1	2	6	2	-3	e

a. [4 points] $\displaystyle\int_0^4 x^{\frac{1}{2}} g'(\sqrt{x^3})dx$

Answer: $\dfrac{-16}{3}$.

Solution: Let $u = x^{\frac{3}{2}}$, $\frac{2}{3}du = x^{\frac{1}{2}}dx$ so the integral becomes $\frac{2}{3}\int_0^8 g'(u)du = \frac{2}{3}(g(8) - g(0)) = \frac{2}{3}(-3-5) = \frac{-16}{3}$

b. [4 points] $\displaystyle\int_4^8 xf''(x)dx$

Answer: $-10+\pi$.

Solution: Let $u = x$ and $dv = f''(x)dx$, so we get $du = dx$ and $v = f'(x)$. Then we get $\int_4^8 xf''(x)dx = xf'(x)\big|_4^8 - \int_4^8 f'(x)dx$, which gives $8f'(8) - 4f'(4) - f(8) + f(4) = 8(0) - 4(1) - 6 + \pi = -10 + \pi$

c. [4 points] $\displaystyle\int_0^\pi \cos(t)f(\sin(t))dt$

Answer: **0**.

Solution: Using substitution, we let $u = \sin(t)$, and so $du = cos(t)dt$. Then, as $\sin(\pi) = 0$, our integral becomes $\int_0^0 f(u)du = 0$.

d. [4 points] $\displaystyle\int_4^9 f''(\sqrt{x})dx$

Answer: 18.

Solution: Let $u = \sqrt{x}$, and $du = \frac{1}{2\sqrt{x}}dx$. By noting that $\frac{1}{\sqrt{x}} = \frac{1}{u}$, we get that $2udu = dx$, and so integral becomes $2\int_2^3 uf''(u)du$. Then, using integration by parts, our answer is $2\left(uf'(u)\big|_2^3 - \int_2^3 f'(u)du\right)$. The answer is then

$$2(3f'(3) - 2f'(2) - f(3) + f(2)) = 2(3(7) - 2(4) - 9 + 5) = 18$$