AP Calculus BC — Accumulation Function & FTC

1) $Y=\int_0^{x^2} e^{t^2}dt$

$\frac{dy}{dx}=2x\,e^{x^4}$

2) $f(x)=\int_6^{x^2}\cot 3t$

$f'(x)=2x\cot 3x^2$

3) $F(x)=\int_x^7\sqrt{2t^4+t+1}\,dt$

$F'(x)=-\sqrt{2x^4+x+1}$

4) $y=\int_{-\pi}^{x}\frac{2-\sin t}{3+\cos t}\,dt$

$y'=\frac{2-\sin x}{3+\cos x}$

5) $y=\int_{\sqrt{x}}^{0}\sin(r^2)\,dr$

$\frac{dy}{dx}=\frac{-1}{2\sqrt{x}}\sin x$

6) $f(x)=\int_{x^2}^{x^3}\cos(2t)dt$

$3x^2\cos(2x^3)-2x\cos(2x^2)$

7) $g(x)=\int_7^x\frac{1+t}{1+t^2}\,dt$

$g'(x)=\frac{1+x}{1+x^2}$

8) $g(x)=\int_x^6\ln(1+t^2)dt$

$g'(x)=-\ln(1+x^2)$

9) $g(x)=2x+\int_0^x f(t)dt$

a) $g(-4)=8+\int_0^{-4}f(t)dt$

$=8-\frac{1}{4}\pi(3)^2+\frac{1}{4}\pi(1)^2$

$=8-2\pi$

b) $g(-3)=-6+\int_0^{-3}f(t)dt$

$=-6-\frac{9\pi}{4}$

c) $g(0)=0$

d) $g(1.5)=3+\int_0^{1.5}f(t)dt$

$=3+\frac{1}{2}(1.5)(3)$

e) $g'(x)=2+f(x)$

$g'(-3)=2+f(-3)$

$g'(-3)=2+0=2$

f) $g'(0)=2+f(0)$

$=5$

g) $g'(1.5)=2+f(1.5)$

$=2$

h) $g''(x)=f'(x)$

$g''(-3)=f'(-3)=\emptyset$

i) $g''(0)=f'(0)=\emptyset$

j) $g''(1)=f'(1)=-2$

10) $g(x) = 5 + \int_0^x g'(t)\,dt$

$g(3) = 5 + \int_0^3 g'(t)\,dt$

$= 5 + \frac{1}{4}\pi(2)^2 + \frac{1}{2}(1)(3)$

$g(-2) = 5 + \int_0^{-2} g'(t)\,dt$

$= 5 - \frac{1}{4}\pi(2)^2$

11) $g(x) = \int_0^x f(t)\,dt$

$g'(x) = f(x)$

$g''(x) = f'(x)$

$g(-4) = \frac{1}{2}(1)(2) - \frac{1}{2}(1)(2) - 2 - \frac{1}{2}(1)(2)$

$= -3$

$g'(-4) = 0$

$g''(-4) = 2$

$g(-1) = \frac{1}{2}(1)(2)$

$= 1$

$g'(-1) = 0$

$g''(-1) = -2$

$g(4) = 3$

$g'(4) = 0$

$g''(4) = -2$