1. (a) $\int (12x^2+10)(2x^3+5x+5)^9\ dx = \int 2(6x^2+5)(2x^3+5x+5)^9\ dx =$

   $\int 2u^9 du = \frac{2u^{10}}{10} + C = \frac{(2x^3+5x+5)^{10}}{5} + C$

   $u = 2x^3+5x+5$
   $du = (6x^2+5)dx$

   (b) $\int \frac{8x^2}{\sqrt{x^3+2}}\ dx = \int \frac{8}{\sqrt{u}} * \frac{1}{3} du = \int \frac{8}{3} u^{\frac{-1}{2}} du = \frac{8}{3}\frac{u^{\frac{1}{2}}}{\frac{1}{2}} + C = \frac{16}{3}\sqrt{u} + C = \frac{16}{3}\sqrt{x^3+2} + C$

   $u = x^3+2$
   $du = 3x^2 dx$
   $\frac{du}{3} = x^2 dx$

2. (a) $\int (x^3+2)\cos(x^4+8x)\ dx = \int \frac{1}{4}\cos(u) du = \frac{1}{4}\sin(u) + C = \frac{1}{4}\sin(x^4+8x) + C$

   $u = x^4+8x$
   $\frac{du}{4} = (x^3+2)dx$

   (b) $\int \frac{3e^{3x}-2e^{-2x}}{e^{3x}+e^{-2x}}\ dx = \int \frac{1}{u} du = \ln(u) + C = \ln(e^{3x}+e^{-2x}) + C$

   $u = e^{3x}+e^{-2x}$
   $du = (3e^{3x}-2e^{-2x})dx$

3. (a) $\int_0^A 4e^{2x} - 10\sin(2x)\ dx = (2e^{2x}+5\cos(2x)) \Big|_0^A = (2e^{2A}+5\cos(2A)) - (2+5) = 2e^{2A}+5\cos(2A) - 7$

   (b) $\int_B^5 \frac{7}{x} - \frac{2}{x^2}\ dx = 7\ln(x) + 2x^{-1} \Big|_B^5 = 7\ln(5) + \frac{2}{5} - \left(7\ln(B) + \frac{2}{B}\right)$ or $7\ln(5) + \frac{2}{5} - 7\ln(B) - \frac{2}{B}$

4. $\int_1^B x^2 e^{x^3+2}\ dx = \int_{x=1}^{x=B} \frac{1}{3} e^u du = \frac{1}{3}e^u \Big|_{x=1}^{x=B} = \frac{1}{3}e^{x^3+2}\Big|_1^B = \frac{1}{3}e^{(B^3+2)} - \frac{1}{3}e^3$

   $u = x^3+2$
   $\frac{du}{3} = x^2 dx$

5. problem was omitted. To solve this problem, you need to know the size of the population in 1990.

6. note: to find the y-value use the fundamental theorem of calc.

   $\int_0^2 f'(x)dx = f(2) - f(0)$
   $132 = f(2) - 20$
   $f(2) = 152$

   other values computed in a simular manner.

   (a) local minimum: $(20, -28)$
   (b) local maximum: $(8, 152)$ and $(32, 172)$