MATH 140: Quiz 6

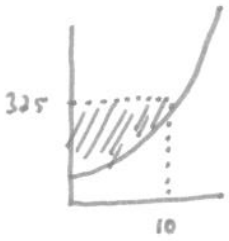
Name: Ans Key

#1. (10 points) Find the average value of the function $f(t) = \ln(t^4 + t)$ on the interval $[10, 100]$.

$$\frac{1}{100-10}\int_{10}^{100} \ln(t^4+t)\,dt = \frac{1}{90}(1389.97) = 15.44$$

#2. (10 points) The ~~demand~~ supply curve for a product is given by $p = 3q^2 + 25$ and 10 units are sold. What is the producer surplus?

$$p^* = 3\cdot 10^2 + 25 = 325$$



$$\int_0^{10} 325 - (3q^2+25)\,dq = 2000$$

Bonus (5 points) The profit of a product over the next 5 years is given by $\pi(t) = 20 - 2t$ (dollars/unit) where t is the number of years from now. The number of units sold will be $q(t) = 1000 - 40t$ (units/year). If you can continuously and immediately deposit your profits into an account with 4% interest rate, how much will you have at the end of the 5 years?

$$S(t) = \pi(t)q(t) = (20-2t)(1000-40t)$$

$$\therefore\quad B = \int_0^5 (20-2t)(1000-40t)\,e^{.04(5-t)}\,dt \overset{\text{W}}{=} 76753.45$$